Hypermobility Syndrome Among Misr University Students

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ABSTRACT

Objective: *To investigate the prevalence of hyper mobility and its relationship to musculoskeletal disorders, also to find out if there are any extra-articular features among the university students.* ***Methods:*** *The participants were 266 (113 male and 153 female university students). The data were obtained by personal interview and physical examination consisted of Beighton scores. The information recorded were joint pain, soft tissue injuries, skin features, tempromandibular joint dysfunction, presence of familial hypermobility as well as any extra-articular features.* ***Results:*** *The frequency of hypermobility is more evident in females. In both males and females the most related variable was family history and the least one was the extra-articular features. Thumb mobility is related to total mobility in both males and females where P<0.05 and the coefficient of association was 0.41and 0.47 in male and females respectively. . No significant relation was found between hypermobility and pain in males while in females, hypermobility was only related to knee pain and low back pain. In females the relation between hypermobility and knee pain was stronger than the relation between hypermobility and LBP where the coefficient of association were.35 and .225 respectively. Positive association between regional mobility of thumb and total mobility was found in both sexes in this study.*

Key words: *Hypermobility; Musculoskeletal pain; Joint laxity; Beighton score; Syndrome; extra-articular features.*

INTRODUCTION

Hypermobility means over flexibility of the joint and was defined as a range of motion in excess of normal. The generalized hypermobility conferred a positive advantage on those seeking admission to ballet school, however, this advantage may soon fade. Injuries were significantly more numerous among those with hypermobility[1,3]. Hypermobility may be considered an advantage if present in certain joints, at the same time it could be disadvantage in other joints in the same person[4].

The majority of hypermobile individuals are asymptomatic however few develop the hypermobility syndrome (HMS)[5,6]. The hypermobility syndrome was recognized as a distinct pathology in the absence of systemic rheumatic disease[5]. Hypermobility as well as hypermobility syndrome is more prevalent among females than males[7,8]. Hypermobility syndrome is also more prevalent among Asians than among Africans and it is more prevalent among Africans than among Caucasians[9]. Hypermobility is often pauciarticular than polyarticular and it does not have to be generalized to cause symptoms[4].

Hypermobility syndrome is thought to be an inherited connective tissue disorder[9]. It might result from a variety of non pathogenic polymorphisms, as a consequence of minor variations in extracellular matrix genes encoding, for example collagens, elastins, fibrllins or tenascins, other polymorphism might be in different more interactive protein, rendering them pathological[10]. It has features overlap its more serious cousins. Marfan, Ehlar Danlos syndrome and osteogensis imperfecta, though in general its features are milder and less in degree[11]. Some experts prefer to use the term HMS Instead Benign HMS because of the effect of this syndrome on quality of life[12]. There are inconsistencies in the literature on joint hypermobility and how it relates to and overlaps with milder forms of heritable disorder of connective tissue (HDCT). There is no reliable method of differentiation between joint hypermobility syndrome, articular hypermobility and Ehler Danlos syndrome (hypermobility type).

Some studies have suggested a definite causal link between hypermobility of joint and musculoskeletal disorders (MSDs)[5,7,8,13] but others have not found such a link[14,15]. In any age cohort, the score for musculoskeletal symptoms is always positively related to the mobility score, this relationship is most evident in female[7]. Generalized hyper mobility

syndrome mainly associated with joint pain. Pain may involve any joint but most commonly involves the knee and the ankle[16]. Knee pain, back and wrist joint pain, in descending order were found to be the commonest type of complaints[17]. Some studies suggest that proprioception in the joints of patients with HMS is impaired[18]. Hypermobility of knee joint may be a contributing factor in the pathogenesis of chondromalatia patella[19]. It is not clear that hypermobility is clinically associated with tempromandibular joint disorders[20]. Generalized joint hypermobility with musculoskeletal symptoms does not seem to be restricted to joint tissues [21].

The commonly two used clinical assessment tools for hypermobility, the Carter and Wilkinson criteria (> or = 3 positive tests out of 5) and the Beighton method (> or = 4 positive tests out of 9)[23]. The scoring system of Beighton was designed for epidemiological studies. Most investigators use Beighton score of ≥ 4/9 to indicate generalized joint laxity[15,17,22,23]. The Brighton criteria were developed to establish diagnostic criteria for (BJHS). BJHS is diagnosed through a set of major and minor criteria -a combination of symptoms and objective findings- There is some evidence that arthralgia ;the proposed major criteria is major component of alleged hypermobility problems. But there is no clear evidence that proposed BJHS minor diagnostic criteria are associated with hypermobility related problem[23].

Joint hypermobility syndrome is commonly overlooked, misdiagnosed and hence inappropriately treated leads to much unnecessary suffering[24]. Joint hypermobility syndrome is not an easy condition to treat. Physiotherapy forms the mainstay of treatment but has to be tailored to the needs of intrinsically vulnerable tissues otherwise it may aggravate rather than relieve symptoms[25]. Hypermobility syndrome joints are vulnerable to stress at end of range and that passive stretches and positions can cause chronic and recurrent problem[16], over training focusing on joint flexibility rather than stability may all increase joint pain and the risk of injury[26], hence there is a need to draw the attention of physical therapists to include hypermobility tests in their physical examination, as the successful management of patients with HMS includes early recognition of joint laxity before the symptoms may become chronic[6]. The purpose of this study was to investigate the prevalence of hyper mobility and its relationship to musculoskeletal disorders, also to find out if there was any extra-articular features among students population aged 18-24years.

SUBJECT AND METHODS

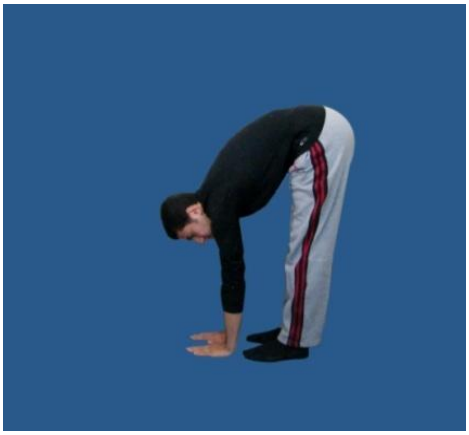
The participants were 266 (113 Male, 153 Female) university students from faculty of physical therapy, Misr University for Science and Technology. Informed consent was obtained from all student participate in the study. The subject age ranged from 18-24 years. The technique of Sample by conglomerate was used. The lab section was the conglomerate. All the students attending any one lab section were included in the study. Students other than Egyptians were excluded. The data were obtained by personal interview and physical examination of all subjects whether or not they had musculoskeletal complaints. The information recorded were joint pain, soft tissue injuries including joint sprain, dislocation, swelling, tendinitis, skin features including poor healing, excessive scar from minor cut, easy bruising and skin laceration, tempromandibular joint dysfunction, the presence of familial hypermobility as well as any extra articular features.

The physical examination and recording were performed by the same examiner for all subjects. The physical examination consisted of assessment of hypermobility according to Beighton scores[7]. It is a series of tests which have been used to assess the articular mobility. Each participant was given a numerical score of 0-9, one point being allocated for each test, it is currently the most commonly used method and as such allows comparison in epimediological studies. Fig. (1) includes the following tests.

(A)

(B)

(C)



(D)

(E)

Fig. (1): Maneuvers used to calculate the Beighton score. A) Passive hyperextension of the little finger. B) Passive appositions of the thumb on the ventral aspect of the forearm. C) Hyperextension of the elbow beyond 10. D) Forward flexion of the trunk, with knees straight so that the palms of the hands rested easily on the floor. E) Hyperextension of the knee beyond 10.

A- Passive dorsiflexion of the little fingers beyond 90.
B- Passive appositions of the thumbs to the flexor aspects of the forearm.
C- Hyperextension of the elbow beyond 10 degrees.
D- Hyperextension of the knees beyond 10 degrees.

E- Forward flexion of the trunk, with knees straight, so that the palm of the hands rested easily on the floor. These tests were all easy to perform and the result represented quantitve measurements. The scale is valid for the measurement of joint mobility and gave reproducible results.(Beighton,eta)[17].

As the articular mobility is a graded trait with no clear cut distinction .Student were divided into four groups according to their mobility scores. Group A (zero), Group B (1-3), Group C (4-6), and Group D (7-9). Obtaining data, by personal interview and physical examination of all subjects whether or not they had musculoskeletal complaints has an advantage over the use of self-administered questionnaires. The former method is regarded as appropriate and more accurate than the latter method. Students with generalized hypermobility were classified to have joint pain in cases of arthralgia in more than two joints.

Statistics

The Chi-square test of independence was used to test the relationship between

- Hyper mobility and the six variables (clinical pictures), including soft tissue lesions, tempro-mandibular joint disorders, skin features, extra-articular features, family history and joint pain.
- Regional mobility and total hyper mobility.
- Regional pain and total hyper mobility.

RESULTS

The mobility scores for males and females in the four groups were shown in Table (1). The increased frequency of hypermobility was evident in females more than males. It was found that only one female student has all the nine scores. The frequency (percentage) of the clinical pictures including joint pain, soft tissue lesions, tempromandibular joint disorders, skin features, extra-articular features, and family history are shown in Tables (2 and 3) for males and females consequently. Soft tissues injuries include ligament sprain, subluxation, dislocation, tendinitis and joint effusion. Tempromandibular joint disorders include clicking, spasm, subluxation and pain during opening and mastication. Skin features include excessive scars from minor cut, poor healing, easy bruising, and skin laceration. Fig. (2) showed wide scar in a female, it was started by small cut repaired by ugly scar, when she made a plastic surgery to hide the scar the area of the scar tissue became larger and wider. The extra-articular features included difficulty in sleep, rectal prolapse, excessive sweating, bowel disturbance and fainting. Family history of hypermobility for the 1st degree relatives was found in 50% in group D for both males and females. There was a history of parent's osteoarthritis, spontaneous Knee effusion, low back pain, and varicose veins.

Fig. (2): Healing by wide scar.

Table (1): Mobility scores of the students.

Mobility scores	Zero	one-three(B)	four-six(C)	seven-nine(D)	Total
Male	42(37.1%)	44(38.9%)	25(22.1%)	2(1.7%)	113(100%)
Female	29(18.9%)	54(35.2%)	58(37.9%)	12(7.8%)	153(100%)

Table (2): Number (percentage) of males with clinical pictures in each groups.

Clinical pictures	A (n=42)	B (n=44)	C (n=25)	D (n=2)
Joint pain	4(10%)	7(15.90%)	7(28%)	0(0.00%)
Soft tissue lesions	3(7%)	2(4.50%)	7(28.00%)	1(50.00%)
TMJ disorders*	1(2.30%)	5(11.30%)	5(20.00%)	1(50.00%)
Skin features	2(4.70%)	4(9.00%)	9(36%)	0(0%)
Extra-articular features **	7(16.60%)	15(34.00%)	9(36.00%)	2(100%)
Family history	0(0.00%)	2(4.50%)	6(24%)	1(50%)

*Tempromandibular joint disorders

**Extrarticular features: includes excessive scar from minor cut, poor healing, easy bruising and skin laceration.

Table (3): Number (percentage) of females with clinical pictures in each group.

Clinical pictures	A (n=29)	B (n=54)	C (n=58)	D (n=12)
Joint pain>2 joints	2(6.80%)	12(22.20%)	24(41.30%)	7(58.30%)
Soft tissue injuries	2(6.80%)	1(1.80%)	16(27.50%)	4(33.30%)
TMJ disorders	0(0%)	1(1.80%)	9(16%)	3(25%)
Skin features	2(6.80%)	6(11.10%)	25(43.10%)	3(25.00%)
Extra-articular features	3(10.30%)	11(20.30%)	323(9.60%)	5(41.60%)
Family history	0(0.00%)	3(5.50%)	3(51.70%)	6(50.00%)

The relation between hypermobility and all variables of clinical pictures, for males, was significant except joint pain (P value $\geq$ 0.05) while in females it was noted that all variables were related to hypermobility. In both males and females the most related variable to hyper mobility was family history and the least one was extra-articular features. While the percentage of regional mobility is higher in the little finger than in the thumb in both males and females, the relation between regional mobility and total mobility was found in the thumb rather the than little finger, this is due to the greater difference between groups in thumb mobility than little finger. It was found that in males there was no relation between total mobility and mobility in any region except mobility of thumb (P value <0.05), the coefficient of association was 0.41. In females it was noted that there was a relation between total mobility and mobility for each region except the mobility of spine, while the thumb mobility was the most related regional mobility to the total mobility ,(P value < 0.05) and coefficient of association was 0.47, so the thumb mobility may be used as an indicator for total mobility in both males and females. There was increased prevalence of mobility in all regions except spine. Regional mobility of the spine scores 7-9 was found in 30% of female students compared with 0% in males.

The frequency (percentage) of regional pain and hypermobility for both males and females were shown in Tables 5 and 6 consequently. It was noted that in males, there was no relation between pain in any region and hypermobility as chi square test was not significant (P value > 0.05), while in females, relation between regional pain and hypermobility was only found in low back pain and knee pain, but the relation between hypermobility and knee pain was stronger than the relation between hypermobility and low back pain. Coefficients of association for knee and low back pain were 0.35 and 0.225 consequently. It was noted that most of the females who had hypermobility in knee had also knee pain. Fig. 3 showed the percentage of females having knee mobility and knee pain. Females who have spinal mobility and complained of low back pain were only two in group C and another two in group D.

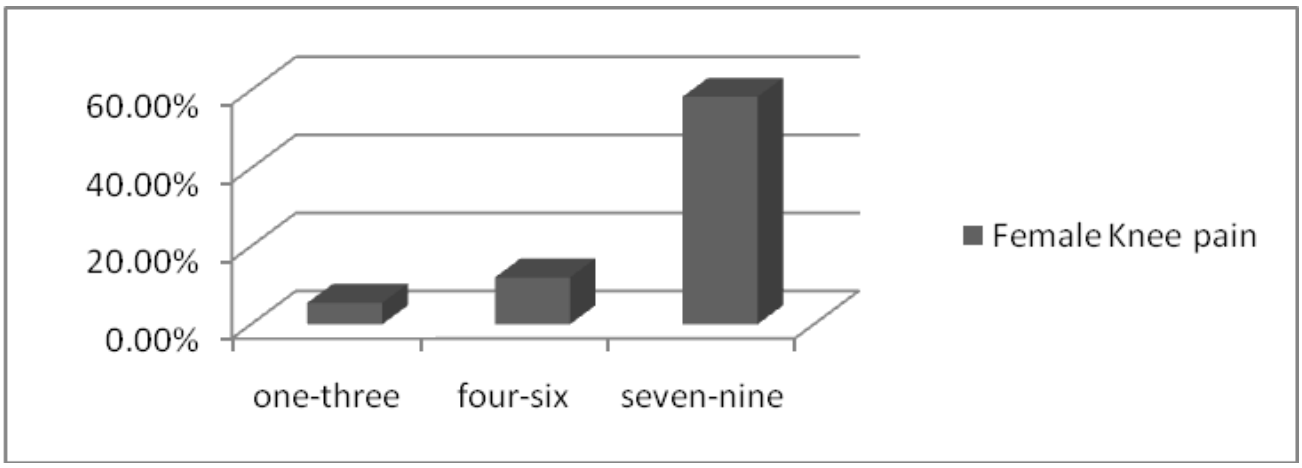


Fig. (3): Frequency of females with hypermobility of knee joint and regional pain of knee

Table (4): Frequency (percentage) of regional mobility in males and females.

Regions	one-three		Four-six		Seven-nine	
	Male	Female	Male	Female	Male	Female
Little finger	29(77.2%)	38(70.30%)	24(96%)	58(100%)	2(100%)	12(100%)
Thumb	2(4.50%)	2(3.70%)	18(72%)	41(70.60%)	2(100%)	11(91.60%)
Elbow	8(18.10%)	8(14.80%)	13(52%)	33(56.80%)	2(100%)	11(91.60%)
Knee	3(6.80%)	4(7.40%)	4(16%)	20(34.40%)	2(100%)	11(91.60%)
Spine	4(9.00%)	6(11.10%)	4(16%)	4(6.80%)	0(0%)	4(33%)

Table (5): The frequency (percentage) o f Regional pain in male groups.

Region	Zero	one-three	Four-six
Shoulder	2.30% (1)	7% (3)	0% (0)
Knee	9.50% (4)	18% (8)	28% (7)
Cervical	4.70% (2)	11.30% (5)	4% (1)
Low back pain	26.10% (11)	15.90% (7)	28% (7)

Table (6): The frequency (Percentage) of regional pain in female group.

Region	Zero	one-three	Four-six	Seven-nine
Wrist & hand	0.00% (0)	4% (2)	5% (3)	0% (0)
Shoulder	0.00% (0)	12.90% (7)	15.50% (9)	0% (0)
Knee	10.30% (3)	16.60% (9)	47% (27)	58.30% (7)
Cervical	10.30% (3)	11.10% (6)	10.30% (6)	25% (3)
Low back pain	17.20% (5)	35% (19)	48.20% (28)	41.60% (5)
Foot	3.40% (1)	1.80% (1)	5.10% (3)	8.30% (1)

DISCUSSION

All the 266 students in our population are Egyptians aged 18-24. Although our sample was not drawn from the general population it was noticed that the students were from different governorates. The incidence of hypermobility (23.8% in males and 44% in females) was high as that in Iraqi students, as AL Rawi, et al.,[8] found the percentage to be 25.4% in males and 38.5% in females). Joint hypermobility in west Africa,

in rural population aged 6-60 was found to be (57% in females and 35% in males), 11% are positive at all five sites[13] compared to only one female in our study. Asian Indians were significantly more mobile than English Caucasian. In normal English Caucasian no subject was found to have scores 7-9, and the percentage of hypermobility was 2.9% in males and 8.6% in females[9]. So the results of the current study have confirmed racial and sex variation in hyper mobility.

Several authors analyze mobility using 3 groups considering 0-3 mild, 4-6 moderate and 7-9 sever[6,8,27] The classification is similar to ours except that we consider a separate group zero score as non hypermobile group. So precentage of hypermobility score of this study can be compared with other authors[6,8,27] specially groups with scores 4-6 and 7-9. Researchers and clinicians have not only failed to agree on a single scale; they have also failed to agree on a specific cut off criterion for HMS in these scale, most investigators use a score equal or more than 4 out of 9 to indicate hypermobility[13-15]. The current study did not put cut off point for determining hypermobility as HMS may be pacuiarticular than polyarticular and it does not have to be generalized to cause symptoms[4], so the current study did not use Brighton criteria but investigated the association of all mobility groups with articular as well as non articular features.

Our findings supported the hypothesis of Kirk[5], who postulated that hypermobile individuals may predispose to musculoskeletal problems. Joint complaints are well correlated with joint hypermobility in Iraq student and were seen significantly more frequently in students scoring 7 out of 9 than student scoring 3out of 9 or less $P<0.0$[8], however, in our study the association between hypermobility and joint pain was only in females ($P< 0.05$). The percentage of female students with joint pain in group D was more than other groups. This is in agreement with Pountain[27]who found that 1.7% of young females with lax joints (scoring 7-9) have increased symptoms in the age group 16-25 years; however the study found no correlation between hypermobility and musculoskeletal symptoms in any age group. Two subjects in Klemp, et al.,[22] study with hypermobility syndrome were Maori Newzealanders females giving a prevalence of 8.7% and raises the possibility that HMS may be relatively common in Maori New Zealanders females. While no association was found between joint pain and hypermobility in West Africa, in Nigeria among those aged 6-60[13], another study among undergraduate students in Nigeria indicated that joint hypermobility syndrome is not rare in Nigerians and found to be higher in females (17%) than males (8%)[17]. While Beighton (1973)[7], indicated that a significantly positive relation exists between joint laxity and arthralgic complaints, this relation was found in males and females in age group 20 to 65+. The correlation coefficient was 0.797 in males and 0.957 in females.

There was an association between hypermobility and soft tissue injuries in agreement with AL-Rawi, et al.,[8] who reported significant ligament sprain ($P<0.01$). The only significant difference between hyper mobile and non hyper mobile students in mean age (15±1.1) was in joint sprain[28]. Skin features including poor healing, easy bruising, excessive scar from minor cut were significant in our sample and shown in table (3) as one variable; While AL-Rawi[8] reported significant poor healing and easy bruising separately in his study. The wide thin scar that was seen in a female case is not the only case recorded to have excessive scar from minor cut but the only case in our sample made plastic surgery to hide and improve the already excessive scar from minor cut, but the surgery lead to more ugly scar. One surgon reported wide, thin scar formation after surgery in patients with HMS[29].

Forward flexion of the trunk was the least site of laxity in females and absent in males. Klempt et al.,[22] suggested that palm on the floor criterion is trainable, However it was the most frequent site of laxity in west Africans[13]. Hyper mobility of fifth finger and apposition of thumb to forearm were more prevalent in females where $P<0.001$[22]. In the current study, hypermobility of thumb was associated with total mobility in both males and females and can be regarded as an indicator of total mobility at this age group, while in another study of middle aged

population of factory workers (38.5+_11.1); it was found that a low number of males had hypermobility of the thumb, and the study attributed this to a vocational factors[30].

Hypermobility of elbow was not associated with pain and this was in agreement with the study of Larsson[4] among musicians who found that only one out of 208 musicians had elbow symptom. In the current study wrist pain was present in 5% of females scoring 4-6 but was not associated with hyper mobility. While Larsson, et al.,[4] reported that hypermobility of joints such as wrist and elbow may be an asset for those playing, flute, piano, and violin. There is a female student who reported after one year of graduation that she cannot do manual therapy as passive movement for cases like hemiplegia or give resistance, also felt fatigue of thumb finger and pain after massage for 10 repetitions, this female student found that traditional exercises for her hand and wrist like small ball or hand grip increased her pain. This is similar to what Russek[16] found in his report about a case study of physical therapist aged 28 years.

Our results are similar to Larsson et al.,[4] who stated that hypermobility of less frequently moved joints such as knee and spine may be symptomatic .Intensity of pain was found to be more in BHS than that of normal persons and that the knee joint were the most affected[23]. In the current study the regional mobility for knee joint was found to be associated with pain in this joint. The mean quadriceps (Q) angle values in healthy hypermobile individuals were significantly higher than that of the non hypermobile ones ($P<0.05$). It may have a prognostic value for probable knee pathologies that may appear in the future[31].

The result of this study is not affected by sport activity; the students were either non sport participant or stop their activity at the end of preparatory or secondary school. So, no student was regular participant for the last three years before the study.

Conclusion

All variables were related to hypermobility in both males and females except joint pain in Male. The most variable related to hypermobility in both males and females was family history while the lowest variable related to hypermobility was extra - articular features. There was a sign of relation between hypermobility and low back pain and also knee pain in females where knee pain was more related to hypermobility. There has been a sign of relation between regional mobility of thumb and hypermobility in both males and females. Further researches are needed to investigate hypermobility syndrome among professional physical therapists.

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الملخص العربي

انتشارخلل المرونة الزائدة بين طلبة جامعة مصر

تهدف هذه الدراسة الى فحص مدى انتشار المرونة الزائدة و علاقتها بخلل الجهاز الحركى بين طلبة الجامعة من سن 18 الى 24 و قد شارك فى البحث 266 طالب منهم 113 ذكور و153 اناث. اخذت البيانات عن طريق المقابلة الشخصية و اجراء الفحص على مرونة المفاصل طبقا لتدريج بيتون. قام بأخذ البيانات و اجراء الفحص باحث واحد. تم اختيار اختبار الاحصائىχ^2 لتقيم العلاقة بين المرونة الزائدة و عدة متغيرات للذكور و الاناث وقد نتج البحث ان هناك ارتباط بين المرونة الزائدة و بعض المتغيرات اهمها التاريخ العائلى و انه لا يوجد ارتباط بين المرونة الزائدة و آلام المفاصل عند الذكور بينما وجدت علاقة بين المرونة الزائدة و آلام الركبة و آلام اسفل الظهر فقط فى الاناث. المرونه الزائدة فى الاناث اكثر ارتباطا بالام الركبه عن الام الظهر.