

## A Study of Joint Hypermobility in School Children of Rawalpindi/ Islamabad, Pakistan: Prevalence and Symptomatic Features

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### ABSTRACT

**Aim:** To find out the percentage prevalence of HMS and its correlation with different aspects including family history, dietary status and socio-economic status

**Methods:** The Hypermobility Syndrome (HMS) is considered as a benign condition in which joint mobility is beyond the normal range. The syndrome is identified by a variety of names and is maximum at birth than in adult life. Women generally have more lax joints than men at all ages. It is a common familial condition which results from genetic variations in connective tissue matrix, associated with common rheumatic disorders. It is aggregation of varieties of articular and extra-articular abnormalities depending on age, race and ethnicity. Hypermobility appears to decrease with advancing age and may present as symptomatic or asymptomatic condition.

**Results:** The data was collected from students of a private school at Rawalpindi city using goniometer. Data was analyzed by using statistical system (*Percentage Method and Chi Square*). It was observed that 30.8 percent students between 8 to 17 years of age were hypermobile. Although both the genders were seen to be hypermobile but its percentage was higher in females than in males. Other non-specific conditions noticed in HMS patients included headache, breathing problems, Flat Feet, Diabetes Mellitus, joint and Heart diseases.

**Keywords:** HMS, Goniometer, Rheumatic disorders, Lax joints.

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### INTRODUCTION

The phenomenon of joint hypermobility (JHM) describes a joint that exceeds the normal range of movement, as determined by restraining joint capsule, ligaments and other soft-tissue constituents surrounding it. JHM have two distinctive entities, symptomatic and asymptomatic. When hypermobility becomes symptomatic, this entity is called hypermobility syndrome (Mehmood *et al.*, 2003). Headache, backache, joint pains, palpitation and lumbar disc prolapse are the basic symptoms in hypermobility syndrome. In most of the cases, hypermobile individual have few or no symptoms and enjoy a problem free life. The Brighton criteria are used to diagnose joint hypermobility syndrome, and laboratory tests are used to distinguish it from other systemic diseases (Grahame, 2000 and Hakim *et al.*, 2004).

The prevalence of hypermobility varies markedly with age, gender, ethnicity and ranges from 2% to 30% (Dawn *et al.*, 2009). Women presents greater

joint laxity than men and up to 5% have symptomatic joint hypermobility compared with 0.6% of men (Engelbert *et al.*, 2004). The highest frequency is seen in families that have one or more affected individuals and among persons of Asian, African, or Middle Eastern descent. Children represent more joint laxity as compared to adults which diminishes gradually during late childhood or early adolescence and more slowly through adulthood. This age-related decline is attributed to progressive biochemical changes in collagen structure that results in stiffening of the connective tissue of the joints; which is supported by biochemical and molecular research on connective tissue disorders (Evermen and Nathaniel, 1998). Generalised joint laxity brings irreversible changes that occur in connective tissues in certain acquired diseases including acromegaly, hyperparathyroidism, chronic alcoholism, and rheumatic fever. Hypermobility is also an important risk factor in the pathogenesis of Osteoarthritis and also caused by errors in genes such as collagens IX (COL 9A1, 9A2, and 9A3), XI (COL 11A1 and 11A2), and V (COL 5A1 and 5A2) (Grahame, 1999). Children without symptoms of HMS show hypermobility that is higher than adults (between 6.7% and 39.6%). In children with fibromyalgia, the prevalence of hypermobility may be as high as 81% (Russek, 1999).

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The main aim of this study is to find out the prevalence percentage of joint hypermobility among school children studying in Rawalpindi/Islamabad, twin cities of Pakistan. The prevalence study is important because it gives the magnitude of problem and enables to understand the dynamic of its transmission and prevention strategies. Few Seminars were arranged to explain the objectives of this study at different schools and prior consents were obtained from the Principals and children's parents.

## MATERIAL AND METHODS

The study was conducted in 2008 among school students of Rawalpindi/Islamabad, Pakistan. The age ranged from 8 years to 17 years. Both the genders were included in this research. Prior permission was taken from schools authorities as population survey procedure. A questionnaire was designed (Mehmood *et al.*, 2003) to note different aspects of student's life including their socio-economic status, presence of familial hypermobility, hours of sports activities and complaints about musculoskeletal system. Beighton scoring was adopted for rating of joint hypermobility by using Goniometer (Beighton *et al.*, 1973). Each step of Beighton scale gives a person one point for each of the following characteristics.

1. Passive extension of the fifth metacarpophalangeal (MCP) joint past 90 degrees.
2. Passive opposition of the thumb to the fore arm.
3. Hyperextension of the elbow joint past 10 degrees.
4. Hyperextension of the knee joint past 10 degrees.
5. Trunk flexion allowing the palms to be placed flat on the floor.

Each limb was scored separately for the first 4 items, generating maximum possible score of 9. Person having score of 6/9 were included in hypermobile condition. The data was statistically analyzed by using the Percentage and Chi Square method. The percentage of prevalence was analyzed by the formula given below. Number of hypermobile individuals / Total individuals  $\times$  100

## RESULTS

The Hypermobility Syndrome (HMS) is a condition that features joints that easily move beyond the normal range expected for a particular joint. Hypermobility is a consequence of abnormal laxity of ligaments, joints capsules and intervertebral discs and

was recognized as a distinct pathology by Kirk *et al.* (1967). Hypermobility is a state not a disease. According to Grahame (2000) joint hypermobility results from genetic variations in connective tissue matrix resulting in stretched tissues but International Nosology of Heritable disorder of connective tissue identified this syndrome as "familial articular hypermobility" (Beighton *et al.*, 1988). It is a diagnostic entity among children with musculoskeletal complaints and aggregation of varieties of articular and extra-articular abnormalities which include high frequencies of varicose veins, piles, uterine prolapse, generalized arthralgia or localized symptoms like frequent backache, ankle sprains, knee effusions and dislocations of shoulders joints (Biro *et al.*, 1983; el-Shahaly and el-Sherif, 1991; Nef and Gerber, 1998).

A total number of 500 students both male and females (300 and 200 respectively) were studied with age ranging from 8 to 17 years as depicted in (Table 1). This study revealed that overall prevalence of HMS in the students of Rawalpindi/Islamabad was 30.8 percent correlating with previous studies by Mehmood S *et al.* (2003). Prevalence of HMS in male students and female student was 29 % and 33.5% respectively. It was found from this study that the incidence of HMS was more in female students. But it was seen that their Chi Square test was non-significant which showed that hypermobility may or may not be common in female students.

Table 1: Total Number of individuals suffering from HMS classified by genders.

Gender	Hypermobile	Normal
Male	87	213
Female	67	133
Total	154(30.8%)	346(69.2%)

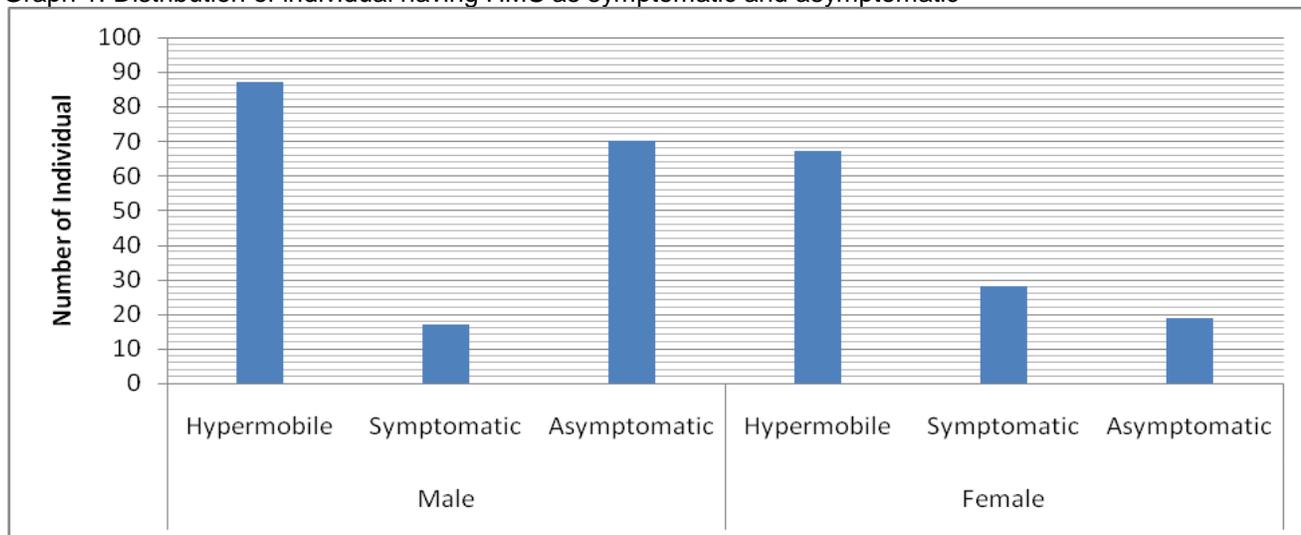
Table 2: Prevalence of HMS with respect to age group

Age (Years)	Male	Female
8-12	50	29
13-17	37	38
Total	87	67

Table 3: Prevalence of HMS with respect to gender wise Beighton scoring

Beighton Score	Male	Female
< 5	187	94
5	26	39
6	43	29
7	33	23
8	9	11
9	2	4
Total	300	200

Graph 1: Distribution of individual having HMS as symptomatic and asymptomatic



## DISCUSSION

The study also revealed that in school students of this region, asymptomatic hypermobility trend was more common in male students than females as shown in (graph 1). It was also evident that 41% of female students were having symptomatic HMS with abnormal palpitation, backache and sprains as compared to 19.5% symptomatic males. The Chi Square test was also non-significant, which shows that these symptoms may or may not be common in hypermobile persons. Normal populations may also suffer from these symptoms. The previous studies by Mehmood *et al.* (1998) suggested that prevalence of HMS among gender was not significant and it could be because of different factors which may includes genetic variation, dietary habits, lack of exercise and self care in the population of that region. Children present with onset of symptoms at the age of 6 with arthralgia, abnormal gait, joint deformity and back pain (Adib *et al.*, 2005). In symptomatic hypermobile children, a more systemic derangement was also present as compared to asymptomatic hypermobile children (Raoul *et al.*, 2003). Surprisingly, large proportion of school students were associated with significant neuromuscular and motor development problems. Swedish school children data showed that general joint laxity was age gender specific and a cut-off point required to be set when evaluating general joint laxity in growing individuals (Janson *et al.*, 2004). The patients with JHS also show many overlap features with genetic disorders such as Ehlers Danlos Syndrome and Marfan syndrome. The delay in diagnosis result in poor control of pain and disruption of normal life style, schooling and physical activities (Adib *et al.*, 2005). In other studies the prevalence of hypermobility in Maori people was

similar to that in European, New Zealanders and Caucasians elsewhere (Kleemp *et al.*, 2002). Hypermobility was localized rather generalized in most patients, and this may be an important reason for the apparent under recognition of the syndrome (Lewkonja and Ansell, 1983).

From the data shown in (Table 2), hypermobility was more common in females between 13 to 17 years of age because of dietary deficiency and less exercise. About 2% of female students had Beighton Score of more than 9. It means that these females were strongly hypermobile and had generally lax joints than men and there was wide ethnic group which had tendency for this condition to run in family when correlated with previous studies of Beighton *et al.*, 1988 and Engelbert *et al.*, 2004. Hypermobility was more common in younger students and it appeared to decrease in adult age.

This study also included the individuals having Beighton Score of five or more. Although the Hypermobile person should have Beighton score of 6 or above as shown in table 3. The reason of excluding the individuals having Beighton Scores around five was that they were on borderline. There were also many non specific problems seen in HMS patients which included headache, breathing problems and rarely flat feet. Headache was the most common non specific symptom found. Family history was also included in this study and the most common familial diseases found in hypermobile individual included Diabetes Mellitus, Heart and Joint disorders.

Joint hypermobility may manifest as pathology in a small proportion, resulting in morbidity and loss of function. It is important to recognize this entity, since accurate diagnosis, reassurance and simple treatment may help the patient considerably. It will in

turn protect them from anxiety, unnecessary medications and burden on National Health Services. It is also of great importance to promote the knowledge of this condition at all levels of health care provision. It is also recommended that research into the genetic aspects of this disorder will help in with prognosis and counseling of families (Adib *et al.*, 2005).

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