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Symptoms in Daily Life and Activity Level of Women with and without Hypermobility

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Abstract

Objective: Generalized Joint Hypermobility (GJH) is defined as a condition in which several joints move beyond their normal limits. It seems to be associated with musculoskeletal disorders, pain, reduced activity level in sports and reduced strength. The aim of the current study was to record specific problems and disorders of hypermobile women and to build subgroups based on these results. As a second objective, the study aimed to identify differences in activity level between these subgroups.

Methods: A total of 195 women were included in this exploratory study: 67 normomobile (NM) and 128 hypermobile. Of these, 56 were classified as hypermobile with symptoms and 47 as hypermobile without symptoms. Symptoms were first recorded with the Canadian Occupational Performance Measure (COPM) and then monthly over a period of 6 months with a face validated questionnaire including general impairment, localization, type, intensity and frequency of problems. Activity level was determined by the International Physical Activity Questionnaire.

Results: On the COPM there was no significant difference between patients in the NM and HM groups. The face validated questionnaire identified the most important problem to be pain in different localizations after remaining in one position for too long. The highest activity level was found in the HM group (p=0.021).

Conclusion: Hypermobile women are active for longer during the day than women with normal mobility, but the type and degree of activity needs further evaluation. More detailed recording of symptoms in women with GJH is required to identify the discrete differences between the groups. To build subgroups in GJH the procedure of screening has to be more comprehensive. Widespread pain and level of activity are aspects that have to be included in the holistic approach to the management of patients with GJH.

Keywords: Joint instability; Collagen diseases; Pain; Survey; Questionnaires; Activities of daily living

Introduction

Musculoskeletal problems are common causes requiring primary health care. Many people with everyday non-inflammatory musculoskeletal problems may have an undiagnosed generalized joint hypermobility (GJH). Some of them even have the more complex multi-systemic condition called joint hypermobility syndrome (JHS). Studies have shown that participants perceived a lack of awareness of JHS in health professionals and more widely in society [1,2].

Joint mobility depends on age, sex and ethnical group and women are usually more often affected by joint hypermobility. According to Graham et al. [3], joint mobility commonly diminishes with age. Mulvey et al. [4] found in a recent survey that the prevalence of joint hypermobility in a general population in the UK was 18%. In this study, joint hypermobility was linked to musculoskeletal disorders and hypermobile participants had a 40% increased risk of reporting severe chronic widespread pain. Furthermore, recurrent joint dislocation or subluxation, arthralgia, soft tissue injuries, back and neck pain as well as fibromyalgia, chronic fatigue syndrome and early osteoarthritis were all associated with joint hypermobility [2,5]. Postural tachycardia syndrome is also one common disorder, which may be associated with joint hypermobility syndrome [6,7].

GJH is mainly diagnosed by the Beighton Score, which includes the angular range of movement of selected joints [8]. The 5-point score of Grahame and Hakim is a short questionnaire to detect generalized joint hypermobility [9]. Another tool, the Brighton Criteria, contain more information about the medical history like symptoms, problems with skin, the appearance and constitution of the affected person and lead to the diagnosis of JHS [10].

In 2016 the diagnostic criteria for JHS were revised [11]. Criteria 1-3 are mandatory and are composed as follows:

Criterion 1: Generalized Joint Hypermobility (GJH)

Criterion 2: Two or more of the following features (A–C) must be present

- A: Systemic manifestations of a more generalized connective tissue disorder

- B: Positive family history with one or more first degree relatives independently meeting the current diagnostic criteria for Ehlers-Danlos-Syndrome
- C: Musculoskeletal complications (must have at least one)

Criterion 3: All the following prerequisites must be met

- A: Absence of unusual skin fragility
- B: Exclusion of other heritable connective tissue disorders
- C: Exclusion of alternative diagnoses

Several authors examined neuromuscular abilities in hypermobile patients classified as GJH and/or JHS compared to normomobile persons. In one study, less precise proprioception was observed in patients with JHS compared to normomobile subjects [12]. Persons with JHS showed reduced balance capabilities compared to normomobile persons. Changes in muscle reflex activity were observed, which could be a possible explanation for the reduced balance [13]. Another study showed that women with GJH without symptoms have a higher rate of force development in the knee extensors than normomobile women [14]. Also, some evidence was found that muscle strength and functional performance of the lower extremity is reduced in women with hypermobile Ehlers-Danlos syndrome [15]. The same group found in a previous study that patients with hypermobile Ehlers-Danlos syndrome demonstrated a significant impairment in knee joint reposition sense and a lower level of sports and physical activity than controls [16]. A systematic review and meta-analysis showed that lower limb proprioception is reduced in people with GJH [17]. In another study an exercise program improved balance and strength and also reduced pain and an improvement in quality of life was observed as a consequence [18]. Unfortunately, the details of the home-based training protocol were unclear. In another study hypermobile women compared to normomobile women showed altered movement patterns during stair climbing aimed at avoiding high muscle activation [19]. The result of a further study indicated that hypermobile women compared to normomobile women might alter their gait pattern in order to stabilize their knee joint [20]. In summary, there is a lack of information to explain how symptoms and neuromuscular abilities are linked to each other.

The overall physiotherapeutic management of persons with JHS is focused on advice, education, exercise and self-management, but more specific knowledge is still required [21,22]. There is some evidence from another study that people with JHS improve with exercise but there is no convincing evidence for specific types of exercise or that exercise is better than control. Schmidt et al. [23] in their study investigated how people with joint hypermobility syndrome make decisions about activity. A few activities were avoided because of such fears; others were undertaken when benefits outweighed costs in pain and distress. They suggested that activity needs to be discussed with patients beyond asking about avoidance and within the context of their lifestyle choices.

In summary, current knowledge about diagnosis, treatment and management of patients with joint hypermobility brings us to the aims of the current study:

- To record specific problems and disorders of women with GJH compared to women with normal mobility,
- To build subgroups within the group of GJH, namely hypermobile women with and without symptoms,
- To identify differences in activity level between women with normal mobility and hypermobile women with and without symptoms.

Methodology

Study design

This project was a prospective exploratory cross-sectional study. Here we present a secondary, exploratory analysis of the data concerning pain, disability and daily life activity. All investigators who completed the measurements were blinded to group allocation. The main results of the project were published elsewhere [19,24-26]. The study was approved by Canton Bern's Ethics Committee (#229/2008) and all participants gave written informed consent. Financial support was given by the Swiss National Science Foundation (#13DPD6 127285).

Participants

The study participants were recruited ad hoc from the staff of the University Hospital Berne and the student body of the Berne University of Applied Sciences. Fact sheets with general information about the study were distributed in the aforementioned institutions. Additionally the study information was spread out *via* the local physiotherapy association and among rheumatologists.

The first contact with interested persons was made by an independent physiotherapist by telephone. On this occasion, inclusion and exclusion criteria were checked and information was provided concerning time and place where the measurements took place. At this time several persons were rejected from participation, because the inclusion criteria were not fulfilled or the persons declined participation for personal reasons, lack of time or inconvenient location of the measurements. When a person agreed to participate, an appointment for the inclusion and the measurements was set. Inclusion criteria were checked by the same independent physiotherapist, which was not involved in the following measurements. After inclusion, the questionnaires were filled out in a separate room and the additional measurements performed. Finally, the follow-up questionnaires for six months (see below) were handed out with the relevant instructions.

The inclusion criteria were the following: women aged 18-40 years, BMI ranging from 18-30 kg/m^2, absence of a severe pain situation or disability that would restrict the completion of all measurements. Women for the hypermobile group (HM) were additionally defined by the Beighton Score ≥ 6/9, those in the group with normal mobility (NM) were allowed a maximum of 1/9 [9]. The cut-off was fixed at 6/9 and 0-1/9, respectively, to achieve a clear distinction between HM and NM [24]. In addition, hypermobile participants had to fulfill mandatory criteria such as hyperextension of the right and/or left knee and/or forward flexion of the trunk with straight legs so that the palms of the hands touch the floor completely. These movements were required because additional biomechanical measurements on the right leg were performed. Exclusion criteria for both groups were surgeries or trauma of the lower leg or lumbar spine and pregnancy within the past 2 years. In addition, women with a diagnosis of Marfan's Syndrome, Ehlers-Danlos syndrome I and II or osteogenesis imperfecta were excluded.

Based on the six monthly follow-up questionnaires the women in the HM were further classified as symptomatic, when mentioning pain

or disability at any time during stair-climbing during the six months. In this way three groups were formed: women with normal mobility (NM), hypermobile women with symptoms (HM-s) and asymptomatic hypermobile women (HM-as).

Questionnaires

The questionnaires used in the current study were the Canadian Occupational Performance Measure (COPM), the International Physical Activity Questionnaire (IPAQ) and a face validated questionnaire. In the current project the official validated version of the German version for both questionnaires was used. The interview was done in one day and symptoms were recorded for the following six months by questionnaire as described below in detail.

Canadian occupational performance measure

The Canadian Occupational Performance Measure (COPM) was developed by occupational therapists as a tool to capture the problems of patients in daily life in a more individual way. The procedure is that in a semi-structured interview the patient has to identify up to five problematic activities. Then, these activities have to be judged on a scale from 1 to 10 for performance and satisfaction with the performance of each activity. The measurement performance of the COPM displays validity in a wide-variety of clinical contexts. The COPM is also a feasible, acceptable and helpful clinical tool within the therapeutic process [27]. The reproducibility (reliability and inter-rater agreement) of the COPM for the prioritized problems was moderate. The reproducibility of the mean performance and satisfaction scores was moderate, but it was poor for the scores for the separate problems. Therefore, only the mean scores should be used for individual assessment [28].

The COPM has demonstrated a test-retest reliability in patients with spinal-cord injuries with the following values r=0.80 for performance and r=0.89 for satisfaction; ICC=0.92 for performance and ICC=0.90 for satisfaction. Therefore, this questionnaire has been shown to be a valid measure across diagnostic categories and treatment settings [29]. The results of another study provide supportive evidence of the convergent and divergent validity of the COPM. The data supports the assumption that the COPM provides information that cannot be obtained with current standardized instruments to measure health [30]. The COPM provides a patient-centered outcome measure that displays good external validity and responsiveness to change [28].

The international physical activity questionnaire

The International Physical Activity Questionnaire (IPAQ) is an assessment developed in 1998 as a more precise tool to detect physical activity in daily life. The questionnaire (long format) consists of 4 domains: during transportation, at work, during household and gardening tasks and during leisure time, including exercise and sport participation. According to Craig et al. [31] IPAQ instruments have acceptable measurement properties that are at least as good as other established self-reports. The long format is recommended for research requiring more detailed assessments. Hagströmer et al. [32] show that the long, self-administered IPAQ questionnaire has acceptable validity when assessing levels and patterns of physical activity in healthy adults.

Face validated questionnaire and follow-up

A COPM was conducted with each subject on the day of assessment. A face validated questionnaire was generated comprising two individually defined problems and three generally known problems in hypermobility. The general problems were defined as the following:

- Lifting 10 kg
- Descending stairs
- Remaining in any sustained position

With the questionnaire the participants were first asked to judge the five problems relevant to a general overview of their impairment on a scale from zero (=no problems) to five (=not possible to fulfill the task). Then they had to identify where, that means in which joint or body region, they have pain during the five activities. After that they were asked to write whether they felt anything other than pain when performing the activities, for example, weakness or a feeling of blockade in a joint. It was possible to give multiple answers to these questions. They then had to determine the intensity of pain during the activities on a scale from zero (=no pain) to ten (=maximum pain). Finally, they had to specify how often they suffer from their disorders on a scale from one (=never) to six (=several times a day). This individual questionnaire was used in the follow-up acquisition over the six month period. The questionnaire was filled in once a month.

Analyses and statistics

Quantitative evaluation: This analysis is a part of a larger cross-sectional project aiming to compare women with and without GJH. This study with post hoc data analyzes was designed as an exploratory study analyzing data from the original study. For the quantitative evaluation, descriptive statistical data of selected parameters were presented as means and standard deviations. Normal distribution of each variable was checked using the Kolmogorov-Smirnov test with the Lilliefors test ($p \leq 0.05$ means a normal distribution). Due to the type of rank data the significance of differences between the three independent groups were calculated with the nonparametric Kruskal-Wallis-Test for COPM. The IPAQ was evaluated with ANOVA and Tukey post-hoc tests. P-values ≤ 0.05 were considered statistically significant. The statistical calculations were conducted using SPSS (Version 24.0, IBM, USA).

Descriptive evaluation: The qualitative evaluation of the follow-up questionnaire was done for the three groups, normomobile (NM), hypermobile with symptoms (HM-s) and hypermobile participants without symptoms (HM-as). Analysis of the individual problems, the localization of the disorders and the type of disorders was conducted.

Results

There were no significant differences between persons in the three groups, normomobile (NM), hypermobile with symptoms (HM-s) and hypermobile without symptoms (HM-as) in age, weight, height and BMI (Table 1). Twenty-five participants could not be classified further because of missing follow up data. At the date of measurement we also had a few drop outs because the criteria for the Beighton Score were not fulfilled (in knee-extension right and/or bending forward not flexible enough). Unfortunately we have no exact number at this point. This fact might mention as limitation in the discussion.

The last dropout we had with the questionnaires, because 25 subjects never sent back their questionnaires.

COPM: There was no significant difference in COPM data between the three groups as shown in Table 2.

		NM (n=67)	HM-s (n=56)	HM-as (n=47)	ANOVA (post-hoc Tukey) p-value
Age	years	24.8 (5.4)	25.3 (5.4)	25.7 (5.3)	0.701
Height	cm	165.7 (5.7)	166.9 (6.2)	167.1 (5.4)	0.378
Mass	kg	60.1 (6.9)	60.2 (7.6)	61.6 (7.6)	0.529
BMI	kg/m^2	21.9 (2.4)	21.6 (2.5)	22.1 (2.5)	0.644
Beighton-Score	n/9	0.3 (0.5)	7.8 (1.0)	7.7 (1.0)	<0.001 (HM-s *vs.* HM-as 0.740 HM-s *vs.* NM <0.001 HM-as *vs.* NM <0.001)
NM: Normomobile group; HM-s: Hypermobile group with symptoms; HM-as: Hypermobile group without symptoms					

Table 1: Group characteristics for the normomobile (NM), hypermobile (HM) and symptomatic (HM-s) and asymptomatic hypermobile (HM-as) groups presented as mean (standard deviation) values for age, height, mass, BMI and Beighton-Score.

		NM (n=65)	HM-s (n=56)	HM-as (n=47)	Kruskal-Wallis p-value
COPM Performance	n/10	5.5 (5.0-6.5)	5.5 (4.5-6.5)	6.0 (5.0-7.0)	0.7
COPM Satisfaction	n/10	5.0 (4.0-6.5)	5.0 (4.0-6.5)	5.5 (4.0-7.0)	0.534
NM: Normomobile group; HM-s: Hypermobile group with symptoms; HM-as: Hypermobile group without symptoms					

Table 2: COPM data for the three groups, normomobile and hypermobile participants with and without symptoms as median values (Q1-Q3).

IPAQ: There was a significant difference in minutes of activity per day. The highest activity level was achieved in the HM-s group (p=0.028 between NM and HM-s) (Table 3).

		NM (n=65)	HM-s (n=56)	HM-as (n=47)	ANOVA (post hoc Tukey) p-value
IPAQ Score (Total)	METS	3157 (2145)	4109 (2453)	3440 (1818)	0.072
IPAQ Score	min/day	407 (138)	485 (147)	437 (165)	0.028 (NM *vs.* HM-s 0.021)
NM: Normomobile group; HM-s: Hypermobile group with symptoms; HM-as: Hypermobile group without symptoms					

Table 3: IPAQ data for the three groups, normomobile and hypermobile participants with and without symptoms as mean values (SD).

Individual problems: In all three groups similar disorders were mentioned in the COPM-Questionnaire as the most limiting ones, namely 'Remaining in any sustained position' (Table 4).

	NM (n=67)	HM-s (n=56)	HM-as (n=47)
Sports	20.9% (14)	28.6% (16)	17.0% (8)
Repetition	2.9% (2)	16.1% (9)	12.8% (6)
Sustained position	37.3% (25)	30.0% (17)	29.8% (14)
Lifting	22.4% (15)	16.1% (9)	23.4% (11)
Walking	4.5% (3)	10.7% (6)	17.0% (8)
NM: Normomobile group; HM-s: Hypermobile group with symptoms; HM-as: Hypermobile group without symptoms			

Table 4: Individual problems mentioned in the COPM by the three groups NM, HM-s, HM-as frequency (%(n)).

Localization of disorders: Persons in all the three groups indicated different localizations, but in all three groups back and neck problems were among the three most important localizations (Table 5).

	NM (n=67)	HM-s (n=56)	HM-as (n=47)
Foot left	4.5% (3)	7.1% (4)	8.5% (4)
Foot right	4.5% (3)	10.7% (6)	6.4% (3)
Knee left	9.0% (6)	16.1% (9)	8.5% (4)
Knee right	13.4% (9)	17.9% (10)	8.5% (4)
Hip left	3.0% (2)	7.1% (4)	2.1% (1)
Hip right	4.5% (3)	7.1% (4)	2.1% (1)

Back	35.8% (24)	37.5% (21)	25.5% (12)
Neck	17.9% (12)	26.8% (15)	21.3% (10)
Others (arms, shoulders)	11.9% (8)	23.2% (13)	17.0% (8)
No disorders	26.9% (18)	14.3% (8)	34.0% (16)

NM: Normomobile group; HM-s: Hypermobile group with symptoms; HM-as: Hypermobile group without symptoms.

Table 5: Localization of the disorders mentioned in the face validated questionnaire by the three groups NM, HM-s, HM-as (%(n)), sum over 6 monthly questionnaires).

	NM (n=67)	HM-s (n=56)	HM-as (n=47)
Pain	46.3% (31)	73.2% (41)	46.8% (22)
Unstableness	5.9% (4)	10.7% (6)	6.4% (3)
Blockade	8.9% (6)	12.5% (7)	8.5% (4)
Others	1.5% (1)	7.1% (4)	21.3% (10)
NM: Normomobile group; HM-s: Hypermobile group with symptoms; HM-as: Hypermobile group without symptoms.			

Table 6: Type of disorders mentioned in the face validated questionnaire by the three groups NM, HM-s, HM-as (% (n) sum over 6 monthly questionnaires).

Type of disorders: Participants in all three groups specified different types of disorders, but the most frequent type of disorder mentioned in the 3 different groups in the context of the individual problem was pain (Table 6).

Discussion

The present study looked at potential differences between persons with generalized hypermobility and those with normal mobility with regard to symptoms and activity level. The highest activity level was recorded for the hypermobile group with symptoms. But only one outcome from several evaluations, namely, minutes of activity per day was significantly higher between HM-s and NM showing that the HM-s group was active longer, but the degree and type of activity needs further evaluation. To our knowledge, there are three studies on this subject. The first study was done with school children and there no correlation was found between hypermobility, activity level and motor competence [33]. The second study was done with adults suffering from Ehlers-Danlos syndrome type III (hypermobility type). In this study the hypermobile patients showed a lower activity level in sports than controls [16]. Finally Schmidt et al. [23] investigated how people with JHS make decisions about physical activity. The results of their study indicate that several activities were avoided, because people were too afraid, and others were performed because convenience took priority over the disorders. The authors summarized that the activity has to be discussed in detail during the rehabilitation process with people experiencing joint hypermobility. In the context of the activity level of hypermobile persons it seems to be important that the activity level itself is monitored in a proper way and that it is then linked to the symptoms. Furthermore, the reasons why hypermobile persons are active or not have to be explored and such aspects have to be taken into consideration for further research.

In our study the evaluation of the symptoms was done with two different tools. The COPM was an important aid in detecting the individual disorders of each participant in a first step. However, the evaluation of performance and satisfaction revealed no significant differences between participants with HM and NM. The COPM does not seem to be sensitive enough to discriminate between these groups. The values for performance and satisfaction were generally higher compared to a study done with patients with chronic low back pain [27]. Based on the data of 195 participants it was possible to build three subgroups based on a follow-up questionnaire. With reference to the individual problems mentioned in the COPM the women in all three groups had some problems in 'Remaining in any sustained position', 'Sports' and 'Lifting'. Additionally women in the HM-s group mentioned problems with 'Lifting' and 'Repetition'. Regarding the localization in all three groups, 'Back', 'Neck' or 'No disorders' were given as most often responses. In the NM and HM-s group 'Back' was the most affected region. In the HM-as group 'No disorders' was mentioned most frequently. However, in the HM-s group generally more disorders were mentioned by more persons. On the other hand, less problems during specific activities were mentioned, maybe also because these activities were less often performed, i.e. for walking.

For the type of disorders in all three groups 'pain' was the most important one. In the NM and HM-s groups 'Blockade' and 'Unstableness' were second and third. In the HM-as group 'Others/Weakness' and 'Blockade' were second and third. Also, in two other studies, the authors have build clusters within the clinical heterogeneity of hypermobility. In these studies the criteria to build the subgroups were based on further anamnestic information, e.g. psychosocial health and non-musculoskeletal symptoms [2,11]. Thus, the advantage in our study is that the grouping was based on observations during six months. In another investigation it was observed that hypermobile persons have problems in different joints of the upper and lower extremities, but also have back and neck pain [2]. Hip problems were observed in a study done with dancers, but it is not only the hypermobility itself that is a problem for these subjects, but also the altered lumbo-pelvic pattern of movement [36]. One large study showed that hypermobile persons have widespread pain at different localizations and a different body perception and proprioception than healthy controls [4].

In the current study the result of the question about the localization of the disorders is as expected and as described in the literature [34,35]. Although the collected data on localization and type of disorders is the sum of all the problems ever mentioned over a period of 6 months, direct comparison between the three groups NM, HM-as and HM-s remains difficult. The results of the current study and the descriptions reported in the literature may indicate that the treatment

of hypermobile persons should not be too localized or guided by a biomechanical approach only. There are some current studies, which took this into consideration such as Palmer et al. [37]. They concluded in their study that the physiotherapeutic management of persons experiencing a hypermobility syndrome should be focused on advice, education, exercise and self-management, but more specific research is still required [21,37]. In another study there is some evidence that people with joint hypermobility syndrome improve with exercise but there is no convincing evidence for specific types of exercise or that exercise is better than control [38].

As a limitation of this study the follow-up, and thus the subgrouping, with the face-validated questionnaire was affected by 25 dropouts, because participants did not return the questionnaire despite requests by mail twice. This value translates to 12% of all participants. Retrospectively, there were some unclear instructions on how to fill in the questionnaire, especially with regard to linked questions. Once a question was answered with 'No disorders' the following questions did not ask for specifications. This fact led to missing data and maybe to some misrepresentation of the symptoms. In summary, on the one hand, the classification of the three groups based on this questionnaire is disputable. But, on the other hand, the observation of all participants over a period of 6 months is strength and might be mandatory to evaluate the clinical pattern of hypermobility. However, since the planning of the present study, the Bristol Impact Questionnaire on Hypermobility (BIoH) as the first condition-specific tool for JHS has been developed and published [39]. It correlates strongly with the Physical Component Score of the SF-36. Other psychometric properties of the questionnaire such as test-retest reliability and sensitivity to change are yet to be established [39]. However, in a future project the BloH might be used, but the questionnaire would have to be translated first, since a German version does not yet exist.

An important strength of this study is that 195 women were evaluated, which is a rather large sample in the field of hypermobility. Furthermore, the symptoms were not only recorded once but regularly over a period of six months. This might be important because BJGH and JHS often show undulating patterns with painful periods followed by states of relatively pain-free activities. Screening of participants was done by the Beighton Score, which achieved good inter-tester reliability and good to very good intra-tester reliability. However, there is a lack of evidence concerning the validity of the screening tools [9,40]. This score measures only the range of motion in several joints. For further research it would be important to use the new published criteria to have a more specific tool to detect JHS [11].

In the present study, the three groups NM, HM-s, HM-as were compared for individual problems, localization and type of disorders. In this comparison the group HM-as reported some problems despite being generally asymptomatic. This fact led us to assume that hypermobile persons do indeed have problems in daily life before they are diagnosed with JHS This context should be taken into consideration when planning appropriate management and treatment and to avoid serious consequences, e.g. episodes of chronic pain. For further research it may also be helpful to compare the hypermobile group with persons who are suffering from nonspecific low back pain (nLBP), because their situation is actually similar: Moseley, in his study, obtained some results indicating that body perception in chronic low back pain is disturbed and tactile acuity is decreased [37,41]. For nLBP one of the most promising possibilities for treatment is exercise [41]. In the current literature motor control exercise and graded activity are recommended as treatments [43-45]. Macedo et al. [44] employed a simple questionnaire in their study on clinical instability, which may help to identify those patients with nLBP who respond best to either motor control or graded activity exercises. In another study by Saner et al. [46] a tailored exercise program versus general exercise for a subgroup of patients with low back pain and movement control impairment was investigated. This study found no additional benefit of specific exercises targeting motor control impairment. In summary, both groups (nLBP and BGJH) have reduced neuromuscular abilities and have a disturbed body perception. The question of whether both clinical patterns have to be managed the same way or which type of therapy would be the most effective one has to be investigated in future research projects.

Conclusion

This study showed slight differences in symptoms and activity levels between hypermobile women and women with normal mobility. Although the hypermobile women in this project were classified as BGJH, half of them complained of pain and disability. Therefore, a more comprehensive procedure of screening and a more specific investigation, mainly in the form of a more focused questionnaire, might help to evaluate the smooth transition between women with hypermobility and those with JHS, or according to the new classification hEDS. Finding more objective and discriminating parameters might help to subgroup this complex clinical picture and facilitate a more individual treatment regimen.

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Conflict of Interest Statement

The authors declare that there are no conflicts of interest.

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