Journal of Natural Sciences Research www.iiste.org
ISSN 2224-3186 (Paper) ISSN 2225-0921 (Online)
Vol.6, No.18, 2016

Assessment of Joint Hypermobility in Adult Patients with Inguinal Hernia: An Analytical Cross Sectional Study from Iraq

Waseem Kamel Ghayth [1] Faiq Isho Gorial [2] *
1.Diploma of rheumatology, Baghdad Teaching Hospital, Rheumatology Unit, Baghdad, Iraq
2.Assistant professor of Rheumatology, Department of Medicine, College of Medicine, Baghdad University, Baghdad, Iraq

Abstract
Background: Weakness of the supporting tissue is one of the causes of inguinal hernia. Joint hypermobility (JHM) is an excessive range of movement of the joint due to laxity of supporting connective tissue.**Objective:** To assess JHM in adult patients with inguinal hernia.**Patients and methods:** A total of 200 individuals were included in this study, 100 patients had inguinal hernia diagnosed by a surgeon based on clinical and abdominal ultrasound examination, and another 100 healthy individuals matched in age and sex were taken as a control group. Age, sex, weight, height, and body mass index (BMI) were recorded. Joint mobility was measured according to Beighton score method for all the participants in the study.**Results:** The mean age of patients was (35.5± 9.5) year and controls (33.2 ± 10.5) year, All the participants were males. The mean BMI was (25.3 ± 3.1) kg/m^2 for patients and (25.1 ± 3.8) kg/m^2 for controls. No statistical significant difference between patients and controls (P>0.05). JHM was significantly more in inguinal hernia patients than in controls (55(55%) vs 20(20%), p<0.001, OR=4.9; 95% CI = 2.6 - 9.2). A multiple logistic regression model was statistically significant and able to predict the group membership with 64% accuracy. Having an average score for joint mobility (4-6) increased the risk of having inguinal hernia by 5.2 times compared to those with negative hypermobility (score<4). Increasing the joint mobility score further to (7-9) increased the risk of having inguinal hernia by 11.3 times compared to those with negative hypermobility (score<4)**Conclusions:** JHM was significantly more prevalent among Iraqi patients with inguinal hernia patients than controls. A higher score for JHM was associated with a higher risk of developing inguinal hernia.
Keywords: Beighton score; inguinal hernia; joint hypermobility.

1. Introduction

The basic mechanisms of hernia formation remain mostly unknown. Previous studies reported that inguinal hernia could be considered a local manifestation of a more generalized collagen pathology. [1-3]. Friedman et al. [4] studied the joint flexibility and reported that three of the nine patients with inguinal hernia were found to be hypermobile, an incidence of 33% versus 5% for the general population. The hypermobile patients had a lower type I/III collagen ratio in skin fibroblast cultures, compared with the other hernia patients. When compared with the controls, all the hernia patients presented a significant increase of the type III collagen synthesis. This altered collagen metabolism could predispose a patient to the development of inguinal hernia and could perhaps be detected by the study of the joint mobility. However, another study by Pans and Albert [5] demonstrated that patients with a groin hernia presented neither joint hypermobility nor clinical evidence of a benign joint hypermobility syndrome. Although abnormal collagen metabolism is likely implicated in hernia formation, this pathology does not seem to have clinical repercussion on joint mobility.

Patients with joint laxity are more susceptible to visceral complications because of weakness of supporting structures [6].A hypermobile joint is a joint whose motion range is above normal regarding age, sex, and race [7].Benign joint hypermobility syndrome (BJHS) is the occurrence of musculoskeletal symptoms in the hypermobile individuals in absence of systemic rheumatologic disease [8].

Because of the conflicting studies and to our knowledge there is no study of joint hypermobility in adult patients with inguinal hernia in Iraq, this study aimed to assess joint hypermobility in adult Iraqi patients with inguinal hernia.

2. Patient and Method

2.1Study design

This analytical cross-sectional observational study was conducted in the General Surgery Department at Baghdad and Al-Yarmuk Teaching Hospitals from August 2014 to March 2015. A consecutive 200 subjects were enrolled in the study, 100 of them were diagnosed as inguinal hernia and 100 were controls. The study protocol was approved by the Ethics Committee of Baghdad University of Medical Sciences, and a written informed consent was obtained from each participant.

.

2.2Sample selection

All patients >18 years with inguinal hernia had their diagnosis on basis of clinical and abdominal ultrasound

examination were included in this study. Patients were excluded from the study if they had a debilitating disease that can cause severe muscle weakness or if they had a history of trauma or surgery to the abdomen or pelvis. Control group matched in age and sex was taken from healthy individuals from rheumatology Unit in Baghdad Teaching Hospital, whom were asymptomatic.

2.3Data collection and measurements

Questionnaire paper consisted of: Age, gender, weight, height, and Body mass index (BMI) which was measured according the equation BMI=weight / height ^{2}, duration of inguinal hernia, and family history of inguinal hernia, The degree of joint hyper mobility in both groups were recorded according to Beighton method by another blinded observer. Participants who recorded 4 or more scores were considered hypermobile. [9]

2.4Statistical analysis

Statistical software (SPSS version 21, IBM, USA) was used for analysis. A target sample size of a minimum 183 individuals was calculated to provide approximately 90% statistical power with medium effect size of 30% and α-error probability of 0.05 as a significant level. Kolmogorov-Smirnov test was used to assess the normal distribution of continuous variables. Continuous variables were presented as mean ±SD, and categorical variables as frequencies and percentages. Statistical significance of differences in median of a non-normally distributed variable between 2 groups was assessed by Mann-Whitney test. Chi-square (χ^2) Pearson test was used to assess the statistical significance of association between 2 nominal or ordinal level variables. To measure the strength of association between 2 categorical variables the odds ratio (OR) was used. A multiple logistic regression model was used to assess predictors of inguinal hernia in JHM patients. P value < 0.05 was considered statistically significant.

3. Results

A total of 100 patients with inguinal hernia and 100 controls were enrolled in this study. All subjects were males. The mean age of controls (33.2+/-10.5 years) was not significantly different from that of inguinal hernia patients (35.5 +/-9.5years). The mean BMI was 25.1+/-3.8 Kg/m2 for of controls and 25.3+/-3.1 for patients (P>0.05). The mean of age, sex, and BMI showed no statistical significant difference between the groups (p>0.05). Sociodemographic variables were similar between both groups.

As shown in figure 1, JHM was significantly more prevalent among patients with inguinal hernia (55%) compared to controls (20%). Identifying hypermobility in a person is expected to significantly increase the risk of having inguinal hernia by 4.9 times.

A multiple logistic regression model was used to assess the role of joint hypermobility in predicting the risk of having inguinal hernia after adjusting for any confounding effect of age and BMI. The model was statistically significant and able to predict the group membership (being a case or control) with 64% accuracy. For each one year increase in age the risk of having inguinal hernia significantly increased by 5% after adjusting for the possible confounding effect of BMI and joint mobility score. BMI had no obvious or statistically significant association with the risk of having inguinal hernia. Joint mobility score had a statistically significant positive association with the risk of having inguinal hernia after adjusting for age and gender. Having an average score for joint mobility (4-6) would increase the risk of having inguinal hernia by 5.2 times compared to those with negative hypermobility (score<4). Increasing the joint mobility score further to (7-9) would increase the risk of having inguinal hernia by 11.3 times compared to those with negative hypermobility (score<4), table 2.

P <0.001
OR = 4.9
95% CI for OR = (2.6 - 9.2)

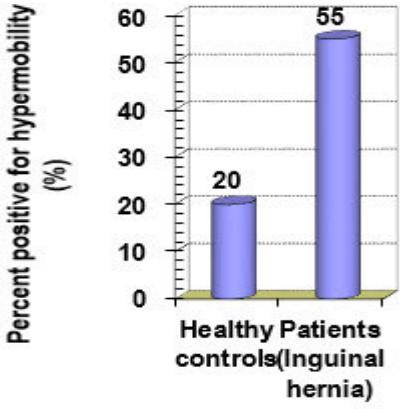

Figure 1: Bar chart showing the Joint hypermobility in patients and controls.

Table 2: Multiple logistic regression model with the risk of having inguinal hernia as the outcome (response) variable and age, BMI and joint mobility score as predictors (explanatory variables).

	P	OR	95% CI for OR
Age	0.01	1.05	(1.01 - 1.08)
BMI	0.58[NS]	1.03	(0.94 - 1.12)
Joint mobitilty score-categories	<0.001		
Joint mobitilty score (4-6) compared to negative (<4)	<0.001	5.2	(2.5 - 10.8)
Joint mobitilty score (7-9) compared to negative (<4)	<0.001	11.3	(3.3 - 38.8)
Constant	0.021	0.06	

P (Model) <0.001
Overall prediction accuracy = 64%
BMI, Body mass index; OR, Odds ratio; CI, Confidence interval

4. Discussion

This is the first study that assessed joint mobility in adult Iraqi patients with inguinal hernia. Interestingly, it showed that JHM was significantly more prevalent in about five folds in inguinal hernia patients than in controls, this is a statistically significant and clinically relevant because it indicates that JHM may increase the risk of having inguinal hernia.

The fundamental mechanisms of hernia formation remain mostly unknown, however several studies indicate that: 1) A connective-tissue pathology affecting mainly the collagen metabolism could play a role in the genesis of groin hernias [10, 11]; 2) Abnormalities of collagen in ligaments causing weakness of supportive tissues could be a risk-factor for the creation of inguinal hernias, theoretically [12, 13]. And 3) It is thought that patients with joint laxity are more susceptible to visceral complications as a result of weakness of supporting structures [3,14]; Therefore those patients may be more prone to inguinal hernia that other individuals.

In the current study, the observed significant JHM was 55% in patients with inguinal hernia compared to 20% in controls. On reviewing literatures, we found only few conflicting studies that reported joint mobility in inguinal hernias. Pans and Albert [15] evaluated joint mobility in adult patients with groin hernias and reported that joint hypermobility was higher among patients with groins hernia than controls (25% in patients vs 16% in controls), However this finding was statistically not significant. The possible explanation of this non-significant statistical results may be related to the smaller sample size in their studies (60 patients vs 62 controls) compared to the current study.

In another study in 2005 at Ankara University, Seçkin et al. investigated the prevalence of BHJS in high schools and concomitant diseases. No difference in the incidence of inguinal hernia was found in these patients [1]. Also, Robinson et al in a study in 2005 demonstrated a high incidence of inguinal hernias in patients with Shprintzen-Goldberg syndrome (a heritable disorder of connective tissue) compared to the normal population [16].

In the present study, on using a multiple logistic regression model to assess the role of JHM in predicting the risk of having inguinal hernia after adjusting for any confounding effect of age and BMI. The present study showed an important finding in which having an average score for joint mobility (4-6) would increase the risk of having inguinal hernia by 5.2 times compared to those with negative JHM and an increasing the joint mobility score to (7-9) would increase the risk of having inguinal hernia by 11.3 times compared to those with negative JHM. We did not find a study to compare with but there were reports of increased total mobility score in patients with hiatus hernia [3] and patients with hemorrhoid [17] compared to controls.

The main limitations of this study are the small sample size which may be solved by larger and longer prospective studies. Furthermore, we reportied a selected group of patients referred to tertiary care, so our findings cannot be generalized to patients in primary care so selection bias might be present. Nevertheless; it is accepted that the investigators may have introduced selection bias in those patients with more severe symptoms [18].

In spite of these limitations, our study revealed a significant clinical application of the association between JHM and inguinal hernia that ignited a considerable scientific interest which may help physicians to early recognition of this problem and subsequently to ensure correct diagnosis and treatment. Although small number of studies were similar to our research but the discordant results suggests the need to conduct more studies with a larger population in different parts of the world with various races.

In conclusion**,** JHM was more prevalent in patients with inguinal hernia than controls. A higher score for JHM was associated with a higher risk of developing inguinal hernia. This may suggest early diagnosis of JHM is recommended for early recognition and management of its visceral complications like inguinal hernia. The findings in this study need to be confirmed by using a larger study sample and for a longer duration follow up.

References

1. Wagh PV, Read RC. Collagen deficiency in rectus sheath of patients with inguinal herniation. Proc Soc Exp Biol Med 1971; 137:382–384
2. Pans A, Pie´rard GE, Albert A, Desaive C.Adult groin hernias: new insight into their biomechanical characteristics. Eur J Clin Invest 1997 ; 27:863–868
3. Pans A, Albert A, Lapie`re CM, Nusgens B. Biochemical study of collagen in adult groin hernias. J Surg Res 2001; 95:107–113
4. Friedman DW, Boyd CD, Norton P, et al. Increases in type III collagengene expression and protein synthesis in patients with inguinalhernias. Ann Surg 1993; 218: 754–760
5. Pans A, Albert A.Joint mobility in adult patients with groin hernias.Hernia. 2003 Mar;7(1):21-4. Epub 2003 Jan 24.
6. Seckin U, Tur BS, Yilmaz O, et al .The prevalence of joint hypermobility among high school students. Rheumatol Int. 2005;25: 260-3.
7. Hakim A, Grahame R. Joint hypermobility. Best Pract Res .Clin Rheumatol. 2003;17:989-1004.
8. Al-Rawi ZS, Al-Dubaikel KY, Al-Sikafi H. Joint mobility in people with hiatus hernia. Rheumatology (Oxford). 2004 May;43(5):574-6.
9. Beighton P. Hypermobility scoring.Br J Rheumatol 1988; 27: 163
10. Sendur OF, Gurer G, Bozbas GT. The frequency of hypermobility and its relationship with clinical findings of fibromyalgia patients. Clin Rheumatol. 2007;26:485–7
11. Remvig L, Jensen DV, Ward RC. Epidemiology of general joint hypermobility and basis for the proposed criteria for benign joint hypermobility syndrome: review of the literature. J Rheumatol. 2007 Apr;34(4):804-9
12. Jenkins JT, O'Dwyer PJ. Inguinal hernias . *BMJ* (2008; 336 (7638): 269–72.
13. Fitzgibbons RJ, Giobbie-Hurder A, Gibbs JO, *et al.* "Watchful waiting vs repair of inguinal hernia in minimally symptomatic men: a randomized clinical trial". *JAMA* 2006; 295 (3): 285–92.
14. Arthritis Research UK. Joint hypermobility. P: 12-14.http:// www. arc. org.uk/ arthinfo/patpubs/6019/6019.asp. Accessed at 31/5/2015
15. Pans A, Albert A. Joint mobility in adult patients with groin hernias. Hernia. 2003 Mar;7(1):21-4.
16. Robinson PN, Neumann LM, Demuth S, et al. Shprintzen Goldberg syndrome: Fourteen new patients and a clinical analysis. Am J Med Genet A. 2005;135:251–62.
17. Yousif UN, Bird HA. Haemorrhoids and joint hypermobility: a new extra-articular association. Clin Rheumatol. 2013 Apr;32(4):523-5.
18. 15.Reilly DJ, Chase JW, HutsonJMet al. Connective tissue disorder – a newsubgroup of boys with slow transit constipation? JPediatr Surg 2008; 43:1111–4.