

Prevalence and risk factors of abdominal hernia among Saudi population

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ABSTRACT

Objective: Studies assessing prevalence and risk factors of abdominal hernia are scarce in Saudi Arabia, that is why this study aimed to find out the prevalence and risk factors of abdominal hernia among the Saudi Population in 2020. **Methods:** A cross-sectional study was done on 500 participants. A pre-designed questionnaire included three sections: Section A consisted of sociodemographic, Section B had items for three dimensions: pain at the site of the hernia or the hernia repair, restriction of activities, cosmetic discomfort; Section C included medical history and other associated risk factors of hernia. **Results:** The prevalence of abdominal hernia in our study was found to be 38.8%. The participants in 18-25 years had less prevalence (21.2%). participants with BMI >25 (Overweight and Obese) had higher prevalence than others. The mean EuraHS-QoL score in participants who had abdominal hernia was significantly higher than patients who didn't have AH. Age >40 years, male gender, BMI >25, congenital anomalies, history of abdominal surgery, history of abdominal trauma, family history, grand multipara, chronic cough, chronic bronchitis, and smoking were potential predictive factors of AH. **Conclusion:** Abdominal hernia is a common problem in Saudi Arabia. Abdominal hernias are more common in men than women, there is an obvious relationship between obesity, history of abdominal surgery, history of abdominal trauma, family history and hernias. Early diagnosis, easily accessible health facilities and health education are important to prevent complications and improve quality of life.

Keywords: Hernia, KSA, population, prevalence, risk factors

Introduction

Hernia is defined as the abnormal protrusion of a part or structure through the tissues that normally contain it. The parts of hernia are sac, neck and contents. Most commonly it contains fat and the intestine.^[1] Abdominal hernias are a very common operative condition that affects all ages and both sexes.^[2]

7.5% of all operations were hernia operations.^[3] Hernia can be found during daily physical exam. They are not necessarily symptom-causing. However, the most common symptoms are

a bulge in the inguinal region or scrotum that may be followed by a dull ache or burning pain that aggravates with exercise or straining, heavy feelings in the abdomen.^[2-4]

Any factors that put more pressure in the intra-abdominal cavity can cause hernia, such as heavy lifting, marked obesity, coughing, straining with defecation, pregnancy and family history of hernia.^[5] It is estimated that more than 20 million hernias are repaired worldwide per year.^[6] Common forms include inguinal hernia, femoral, incisional, umbilical and epigastric hernia, the most frequent one is inguinal.^[7] The only treatment for hernia is surgery, but if there is lower risk of complications, surgery is not required.^[1]

In 2017, a study done showed that hernia was more common in females than males and significantly associated with obesity, grand multipara, previous abdominal surgery, positive family

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history of hernias and previous abdominal trauma.^[2] It was found that in men, increased age was related to higher incidence of inguinal hernia, while lower incidence was linked with overweight and obesity. In women, increased age, rural residence, chronic cough and postmenopausal status was related to higher incidence of inguinal hernia.^[8] Positive family history of inguinal hernia and intensive work activities were risk factors in this study.^[9] A study done revealed that elderly patients, particularly those over 80 years of age, are very often linked to multiple comorbid diseases, thus placing these patients at a higher risk of pre and post-operative complications that may affect incisional hernia formation.^[10] This research also reported an increased risk of developing an inguinal hernia with advancing age, and a lower risk of hernia in male participants with overweight and obesity.^[11]

Male gender, age, family history and BMI were risk factors for umbilical hernias. While male gender, age, family history and hard labor have been reported as risk factors for groin hernias.^[12] Another study shows smokers have a fourfold greater risk of incisional hernia compared to non-smokers.^[13] Specific risk factors perioperatively reported for IH were high BMI, older age, female sex.^[5] Also, another study done in Saudi Arabia showed that in both forms of inguinal hernia, the total activity index and a positive family history remained important risk factors. Through comparison, only direct inguinal hernia was substantially correlated with COPD.^[14] The most common causes are abdominal muscle weakness and the most common risk factors are prior abdominal surgery and overweight, according to the participant's experience.^[15] The study done in Riyadh showed a lack of public awareness of the predisposing factors for hernia among the participants of young Saudi women and men irrespective of age and BMI range.^[7]

Another study suggested waiting until after the last pregnancy to have elective hernia repair since pregnancy after hernia repair raises the chance of recurrence by 1.6 times.^[16] Outside of the physical factors of hernia repair, changes in co-morbidities such as glycemic regulation and exercise tolerance will enhance surgical outcomes.^[17]

Prevalence and Risk factors of Abdominal hernia is still limited in Saudi Arabia, that is why this study aimed to find out the prevalence and risk factors of abdominal hernia among the Saudi Population in 2020.

Subjects and Methods

Study design

A descriptive cross-sectional study.

Study setting

An electronic online survey was carried out.

Study population

The inclusion criteria were all residents above 18 years have or had hernia. And the exclusion criteria were all residents younger than that age.

Study instrument

The newly developed self-administered English version of the questionnaire was adopted from the European Registry for Abdominal Wall Hernias scale (EuraHS-QoL). The draft of our initial questionnaire was made in the English language, which had 37 items. The questionnaire included three sections: section A consisted of sociodemographic, details that had 7 items; Section B had items with Numerical Rating Scale for three dimensions: Pain at the site of the hernia or the hernia repair, restriction of activities, cosmetic discomfort; Section C included medical history and other associated risk factors of hernia.^[2] A standardized methodology was followed in the validation of this questionnaire that included focus group discussion, expert evaluation, pilot study, reliability and validity assessment, etc., The content validity, face validity, and construct validity of the developed questionnaire were examined. Content validity and face validity were established by expert evaluation and focused group discussions. Construct validity was established by exploratory factor analysis with varimax rotation to test the hypothesized domain structure and examine its substructure.

Internal consistency was examined, but test/retest reliability could not be performed because of the paucity of time. The homogeneity of the question items in each domain was evaluated using Cronbach's α coefficient. A coefficient of 0.7 or higher is preferred for a questionnaire to be internally consistent. In the first step, two independent professional bilingual translators translated the original English version of the questionnaire into the Arabic version (forward translation). One of the translators was from a non-medical field and another from the medical field (doctor) and both were native Arabic speakers. The minimal translation criteria were followed with two independent bilingual health professionals for forward translating the questionnaire.^[18] Translators were informed of the target audience of the translation and the medium in which the instrument will be administered. In the second step, a meeting involving the two independent professional bilingual translators and a member from the research group was conducted to review, reconcile, and harmonize the forward translation. Another two independent bilingual translators have then translated this reconciled forward translation back into English. The translated, culturally adapted version of the questionnaire to assess physical activity during the pandemic was pilot tested in 20 samples.

Ethical considerations

The study was approved by the research ethics committee of Taif university.

Data analysis

Data collected were entered and tabulated in Microsoft Excel first and transferred to SPSS version 23 (IBM Corp. USA) for statistical analysis. An independent statistician carried out statistical analysis, who was blinded about the groups in the study. Categorical variables will be summarized as proportions and frequencies and any possible relationship of the variables

will be analyzed using Pearson’s Chi-square test. Continuous variables were expressed using mean and standard deviation and comparisons were done using the student’s ‘t’ test. The relationship of the dependent variable (DV) with other independent variables was analyzed using a multiple regression model to identify predictive factors for burnout among doctors. The significance value was set at $P < 0.05$ and any value above this was considered statistically not significant.

Results

Our study assessed the prevalence of abdominal hernia (AH) and associated risk factors among people living in the Kingdom of Saudi Arabia. Sociodemographic details of the participants showed that 65% were females and 35% were males. The age of the participants is as follows: 29.2% (18-25 years), 35.3% (26-39%), 31.0% (40-59%) and 4.5% (60 years and above). Most of the participants were Saudi nationals (95.9%) and the province distributions of participants are given Table 1.

The prevalence of abdominal hernia in our study was found to be 38.8% [Figure 1]. When we assessed the prevalence in different age groups, it was found that the participants in 18-25 years had less prevalence (21.2%) compared to other age groups and maximum prevalence was seen 40-59 years (50.6%) and 60 years and above (66.7%) that showed a statistically significant association ($P < 0.001$). The gender distribution showed that males had a higher prevalence (48.1%) compared to females (33.9%), which was statistically significant ($P = 0.001$). There was no significant difference observed in the prevalence of AH between Saudi and non-Saudi nationals ($P = 0.274$). The prevalence was comparatively higher in Eastern (54.1%), Western (46.1%), and Central (44.3%) provinces than others ($P < 0.001$) [Table 2].

When we assessed the prevalence of AH based on the Body Mass Index (BMI), it was found that participants with BMI > 25 (Overweight and Obese) had a comparatively higher

prevalence than others that showed a statistically significant relationship ($P < 0.001$). There was also significant association seen in prevalence of AH with presence of congenital anomalies (64.0%; $P = 0.008$), history of previous abdominal surgery (55.4%; $P < 0.001$), history of abdominal trauma (61%; $P < 0.001$), Family history (46%; $P = 0.035$), Chronic cough (64.7%; $P < 0.001$), Chronic Bronchitis (62.3%; $P < 0.001$) and Smoking (55%; $P < 0.001$) [Table 3].

Table 1: Sociodemographic Details of Participants

		Frequency	%
Age (in years)	18-25	156	29.2
	26-39	189	35.3
	40-59	166	31.0
	60 and above	24	4.5
Gender	Female	348	65.0
	Male	187	35.0
Nationality	Non-Saudi	22	4.1
	Saudi	513	95.9
Province	Central	106	19.8
	Eastern	109	20.4
	Northern	105	19.6
	Southern	100	18.7
	Western	115	21.5

Table 2: Prevalence of Abdominal Hernia Based on Sociodemographic Details

		Abdominal Hernia		Total	P*	
		Absent	Present		(Chi-square test)	
Age (in years)	18-25	n	123	33	156	<0.001
		%	78.8%	21.2%	29.2%	
	26-39	n	114	75	189	
		%	60.3%	39.7%	35.3%	
	40-59	n	82	84	166	
		%	49.4%	50.6%	31.0%	
	60 and above	n	8	16	24	
		%	33.3%	66.7%	4.5%	
Gender	Female	n	230	118	348	0.001
		%	66.1%	33.9%	65.0%	
	Male	n	97	90	187	
		%	51.9%	48.1%	35.0%	
Nationality	Non-Saudi	n	11	11	22	0.274
		%	50.0%	50.0%	4.1%	
	Saudi	n	316	197	513	
		%	61.6%	38.4%	95.9%	
Province	Central	n	59	47	106	<0.001
		%	55.7%	44.3%	19.8%	
	Eastern	n	50	59	109	
		%	45.9%	54.1%	20.4%	
	Northern	n	81	24	105	
		%	77.1%	22.9%	19.6%	
	Southern	n	75	25	100	
		%	75.0%	25.0%	18.7%	
	Western	n	62	53	115	
		%	53.9%	46.1%	21.5%	

* $P > 0.05$ is considered to be statistically significant

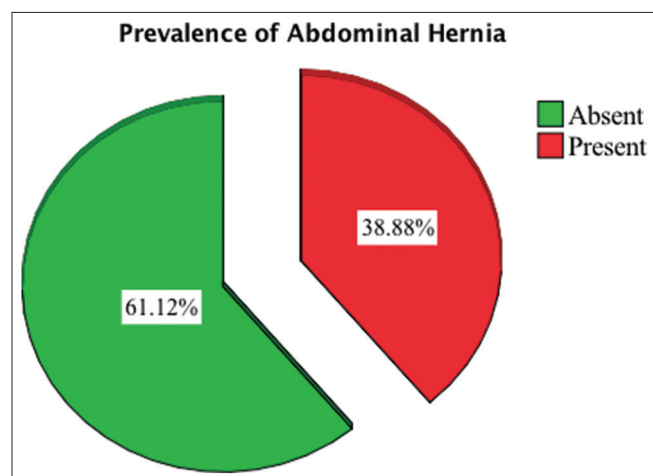


Figure 1: Prevalence of abdominal hernia in the study

Table 3: Prevalence of Abdominal Hernia Based on Personal and Medical History

		Hernia		Total	P* (Chi-square test)
		Absent	Present		
Body Mass Index (BMI)	Under weight	n 27	7	34	<0.001
		% 79.4%	20.6%	6.4%	
	Normal	n 128	46	174	
		% 73.6%	26.4%	32.5%	
	Over weight	n 89	66	155	
		% 57.4%	42.6%	29.0%	
Obese	n 83	89	172		
	% 48.3%	51.7%	32.1%		
Regular physical exercise	No	n 235	163	398	0.093
		% 59.0%	41.0%	74.4%	
	Yes	n 92	45	137	
		% 67.2%	32.8%	25.6%	
Congenital Anomalies	No	n 318	192	510	0.008
		% 62.4%	37.6%	95.3%	
	Yes	n 9	16	25	
		% 36.0%	64.0%	4.7%	
Previous Abdominal surgery	No	n 253	116	369	<0.001
		% 68.6%	31.4%	69.0%	
	Yes	n 74	92	166	
		% 44.6%	55.4%	31.0%	
Previous abdominal trauma	No	n 295	158	453	<0.001
		% 65.1%	34.9%	84.7%	
	Yes	n 32	50	82	
		% 39.0%	61.0%	15.3%	
Family history of Hernia	No	n 246	139	385	0.035
		% 63.9%	36.1%	72.0%	
	Yes	n 81	69	150	
		% 54.0%	46.0%	28.0%	
Repeated pregnancy	No	n 230	130	360	0.060
		% 63.9%	36.1%	67.3%	
	Yes	n 97	78	175	
		% 55.4%	44.6%	32.7%	
Hard labor	No	n 239	148	387	0.626
		% 61.8%	38.2%	72.3%	
	Yes	n 88	60	148	
		% 59.5%	40.5%	27.7%	
Chronic cough	No	n 303	164	467	<0.001
		% 64.9%	35.1%	87.3%	
	Yes	n 24	44	68	
		% 35.3%	64.7%	12.7%	
Chronic Bronchitis	No	n 301	165	466	<0.001
		% 64.6%	35.4%	87.1%	
	Yes	n 26	43	69	
		% 37.7%	62.3%	12.9%	
Smoking	No	n 260	126	386	<0.001
		% 67.4%	32.6%	72.1%	
	Yes	n 67	82	149	
		% 45.0%	55.0%	27.9%	

*P>0.05 is considered to be statistically significant

The mean EuraHS-QoL score in participants who had abdominal hernia was found to 41.53 ± 21.36 and it was significantly higher than patients who didn't have AH ($P < 0.001$) [Figure 2]. All three domains of EuraHS-QoL also showed higher scores that were statistically significant ($P < 0.001$) [Table 4]. When

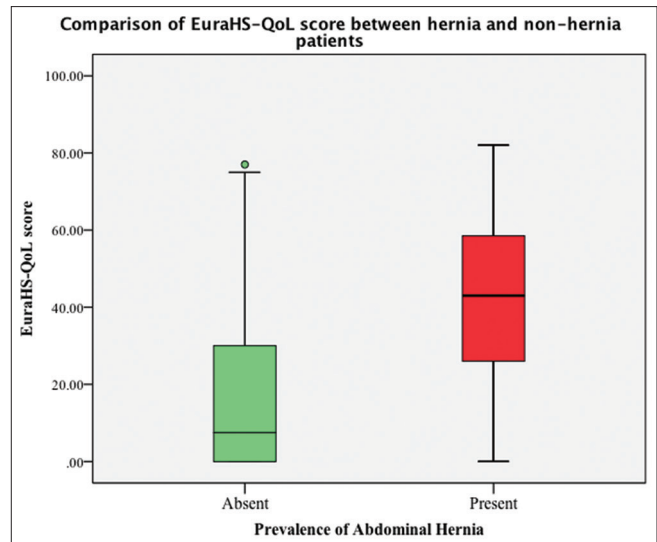


Figure 2: Comparison of prevalence of EuraHS-QoL score in hernia and non-hernia participants

we compared the Total EuraHS-QoL score according to different sociodemographic characteristics, only participants' BMI had shown a significant difference. Participants who had BMI >25 had a higher EuraHS-QoL score (44.54 ± 22.01) than others ($P = 0.001$) [Table 5].

We performed a logistic regression model for analyzing the risk factors of abdominal hernia and a univariate logistic regression showed that age >40 years, male gender, BMI >25, congenital anomalies, history of abdominal surgery, history of abdominal trauma, family history, grand multipara, chronic cough, chronic bronchitis, and smoking were potential predictive factors of AH. A further multivariate logistic regression showed that Age >40 years [OR = 1.88 (1.24-2.84); $P = 0.003$], BMI >25 [OR = 1.78 (1.16-2.71); $P = 0.008$], history of abdominal surgery [OR = 2.04 (1.30-3.22); $P = 0.003$], chronic cough [OR = 1.96 (1.05-3.67); $P = 0.034$] and smoking [OR = 2.08 (1.27-3.40); $P = 0.003$] were all independent risk factors of abdominal hernia [Table 6].

Discussion

Abdominal hernia is a common disorder, particularly the umbilical and para-umbilical hernia, among both genders. However, information about the prevalence and risk factors of abdominal hernia is still limited in Saudi Arabia, that is why this study aimed to find out the prevalence and risk factors of abdominal hernia among the Saudi population. This study showed that 65% were females and 35% were males. The age of the majority of our participants was between: (26-39) and (40-59) most of the participants were Saudi nationals.

This finding confirms that the previous study was done in Arar City which showed that hernias were more common in females than in males and most of the cases were between 18 and 50 years of age.^[2] In our study, the prevalence of abdominal

Table 4: Comparison of EuraHS-QoL Score Between Hernia and Non-Hernia Participants (n=535)

	Abdominal Hernia	n	Mean	Std. Deviation	P* (Student's t test)
Total EuraHS-QoL (0-90)	Present	208	41.53	21.36	<0.001
	Absent	327	17.13	21.17	
Pain (0-30)	Present	208	11.32	7.91	<0.001
	Absent	327	4.75	7.18	
Restriction of activities (0-40)	Present	208	19.69	11.07	<0.001
	Absent	327	8.84	11.07	
Esthetical discomfort (0-20)	Present	208	11.03	6.39	<0.001
	Absent	327	3.53	5.01	

*P>0.05 is considered to be statistically significant

Table 5: Comparison of EuraHS-QoL Score in Hernia Patients (n=196)

		n	Mean	Std. deviation	P* (Student's t test)
Age	>40 years	92	41.80	22.11	0.864
	<40 years	104	41.28	20.78	
Nationality	Saudi	185	41.49	21.43	0.917
	Non-Saudi	11	42.18	21.16	
Gender	Male	86	41.55	22.54	0.990
	Female	110	41.51	20.49	
BMI	>25	145	44.54	22.01	0.001
	<25	51	32.96	16.81	

*P>0.05 is considered to be statistically significant

hernia was found to be 38.8% which is consider high compared with Arar where the prevalence was 11.7% and Russia where the prevalence was 20.9%.^[2,12] In the current study when we measured the prevalence in different age groups, it was found that the participants in 18-25 years had less prevalence compared to other age groups and maximum prevalence was seen between 40-59 years. Our outcomes are comparable to those found in Arar^[2] which concluded that most of the cases were between 18-50 and opposed to the outcomes that were found in Russia.^[12] which concluded that in most cases the age was more than 60 years old.

The prevalence of hernia depends on gender, it showed that males had a higher prevalence compared to females. A similar result was found among the Russian population where the men who had hernia more than women.^[12] We believe that adipose tissue deposition varies between genders, and this can lead to gender differences in hernia formation.^[19,20]

In our study the prevalence of AH depends on the Body Mass Index (BMI), it was found that participants with BMI >25 (Overweight and Obese) had a comparatively higher prevalence than others. This confirms the previous two studies which showed that hernia more in obese people.^[2,12]

In the contrast a study done in Nigeria showed that prevalence of hernia is less in non-obese people.^[9] There was also significant association seen in prevalence of AH with presence of congenital anomalies, history of previous abdominal surgery, history of abdominal trauma, family history, chronic cough and smoking.

These outcomes were similar to a previous study which reported the prevalence of hernia more in those who have a history of previous abdominal surgery, history of abdominal trauma, family history and less in the presence of congenital anomaly.^[2] On the other hand the study done among adult male Nigerians showed that prevalence of hernia was more in those with a family history and less in the presence of smoking, chronic cough.^[9]

The mean EuraHS-QoL score in participants who had abdominal hernia was significantly higher than patients who didn't have AH. This confirms the previous study that showed About most of respondents strongly agreed that their abdominal wall had a significant effect on their health, impacting their discomfort, interfering with everyday activities. this shows us that AH is a significant barrier to QOL and the early hernia repair improves quality of life.^[21,22] When we measured the Total EuraHS-QoL score depending on different sociodemographic characteristics, only participants' BMI had shown a significant difference. Participants who had BMI >25 had a higher EuraHS-QoL score than others. A study done in Al-Kharj concluded that the most common prominent factor for hernia cases was obesity and recurrence was more prevalent in obese patients.^[23]

For obesity cases. Adipose tissue will respond differently to bundles and layers of muscle, weaken aponeurosis, that may cause abdominal hernias.^[24] In the current study analyzing the risk factors of abdominal hernia showed that age >40 years, male gender, BMI >25, congenital anomalies, history of abdominal surgery, history of abdominal trauma, family history, grand multipara, chronic cough, chronic bronchitis, and smoking were potential predictive factors of AH. Our outcome is comparable to other studies in Arar,^[2] the United States,^[8] Russia,^[12] Hong Kong^[14] Riyadh,^[7] Rotterdam^[11] reported that Sex, obesity, marital status, BMI, previous abdominal surgery, previous abdominal trauma, positive family history of hernias and grand multipara were significantly affected by hernias and were not significantly affected by age, regular exercise and congenital abnormalities. This shows us the importance of awareness program and lifestyle modification to decrease the number of patients with abdominal hernia.

Marital status, BMI, previous abdominal surgery, previous abdominal trauma, positive family history of hernias and grand multipara were significantly affected by hernias and were not

Table 6: Logistic Regression of Predictive Risk Factors for Abdominal Hernia

	Univariate regression				Multivariate regression			
	OR	95% C.I.		P	OR	95% C.I.		P*
		L	U			L	U	
Age >40 years	2.44	1.69	3.51	<0.001	1.88	1.24	2.84	0.003
Gender (Male)	0.55	0.39	0.80	0.001	0.76	0.47	1.22	0.255
BMI >25	2.64	1.80	3.85	<0.001	1.78	1.16	2.71	0.008
Absence of regular exercise	0.71	0.47	1.06	0.094	-	-	-	-
Congenital anomalies	2.94	1.28	6.79	0.011	0.94	0.34	2.60	0.906
History of Abdominal surgery	2.71	1.86	3.95	<0.001	2.04	1.30	3.22	0.002
History of Abdominal trauma	2.92	1.80	4.73	<0.001	1.56	0.87	2.80	0.137
Family history of hernia	1.51	1.03	2.21	0.035	1.10	0.71	1.69	0.681
Grand multipara	1.42	0.99	2.06	0.06	-	-	-	-
Hard/difficult labor	1.10	0.75	1.62	0.626	-	-	-	-
Chronic cough	3.39	1.99	5.77	<0.001	1.96	1.05	3.67	0.034
Chronic bronchitis	3.02	1.79	5.09	<0.001	0.96	3.37	0.07	0.955
Smoking	2.53	1.72	3.72	<0.001	2.08	1.27	3.40	0.003

*P>0.05 is considered to be statistically significant; OR=Odds ratio

significantly affected by age, regular exercise and congenital abnormalities. This shows us the importance of awareness program and lifestyle modification to decrease the number of patients with abdominal hernia.

Limitations

Being a study done through an online survey necessitates conducting future studies including a larger and more representative sample of the Saudi community. Also, more than half of the sample are female.

Conclusion

The study findings showed that prevalence of abdominal hernia was 38.8% and age >40 years, male gender, BMI >25, congenital anomalies, history of abdominal surgery, history of abdominal trauma, family history, grand multipara, chronic cough, chronic bronchitis, and smoking were potential predictive risk factors of abdominal hernia. An explicit knowledge regarding the risk factors and other aggravating factors would help the patients and caretakers better manage the diseases, thus reducing the complications related to it and improve quality of life. Healthcare workers, the media, and the ministry of health share a responsibility to inform and educate the people about the risk factors of abdominal hernia.

Summary key points

Abdominal hernias are a very common operative condition that affects all ages and both sexes. An explicit knowledge regarding the risk factors and other aggravating factors would help the patients and caretakers better manage the diseases, thus reducing the complications related to it and improve Quality of life. prevalence of abdominal hernia was 38.8% and age >40 years, male gender, BMI >25, congenital anomalies, history of abdominal surgery, history of abdominal trauma, family history, grand multipara, chronic cough, chronic bronchitis, and smoking were potential predictive risk factors of abdominal hernia. AH is

a significant barrier to QOL and the early hernia repair improves quality of life.

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Conflicts of interest

There are no conflicts of interest.

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