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Research Article

PREVALENCE OF DIFFERENT TYPES OF HERNIA AMONG SAUDI POPULATION: A CROSS-SECTIONAL STUDY

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Abstract:

Background: Hernias occur when weak points in the abdominal wall give way and organs emerge from the body cavity. They can develop in the umbilical area, in the groin area or in any other place where there is an operation scar. Groin hernias are the most common type of hernias and are particularly common in men. An inguinal hernia is often noticeable as a protuberance in the groin region.

Methods: This was an analytical cross-sectional study to spot light on the prevalence of different hernia types among Saudi population. The study was carried out at universities, hospitals and malls in KSA. Data were collected from patients and general population during a period from May to November 2021.

Results: Among the 517 participants; the most frequent age group was 20-30 years [n= 212, 41%] while the least frequent age group was more than 50 years of age [n= 37, 7.2%]; with very close male to female ratio. Furthermore, 120 participants had DM [23.2%], 146 participants were smoking [28.2%] and 57 participants were ex-smokers [11%]. Moreover, 150 participants were suffering from constipation, 104 had cough, 134 perform weight lifting and 65 had previous hernia [the most frequent hernia was umbilical hernia and the least frequent hernia was femoral hernia]. When comparing the risk factors with the presence of hernia, there was no any statistically significant relationships except for the umbilical hernia is statistically significant for females [P = 0.01].

Conclusion: The most common hernia type among the participant was the umbilical hernia and the least common type is the femoral hernia. Moreover, there were no significant hernia risk factors among the participants, except for the female gender, which had a statistically significant relationship with the umbilical hernia.

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INTRODUCTION:

A hernia is a passage of the abdominal viscera with their peritoneum through an opening, which is usually in the abdominal wall. Hernias are based on a simple biomechanical mechanism of origin. If the muscles of the abdominal wall are tensed, for example as part of the abdominal press, the pressure in the abdominal cavity increases, so that the abdominal organs are pressed against gaps in the abdominal wall. If a gap is abnormally large, an organ can be pushed into it. A protrusion of the peritoneum can create a canal through which parts of the greater omentum or individual intestinal loops will next pass. Therefore, a hernia always consists of a sac [peritoneum] with fraction content [viscera] and a hernial orifice [gap in the abdominal wall]. This is what distinguishes a hernia from a prolapse, which does not have a peritoneal hernial sac [1].

Hernia can be classified according to three main principles [2]:

1. According to genesis: acquired and congenital hernia
2. According to the position of the hernial port: external hernias, hernias in the area of the abdominal wall, and internal hernias, hernias elsewhere [e.g., diaphragmatic hernia]
3. According to the location: Inguinal hernia, Umbilical hernia, Femoral, Lumbar hernia, Supravesical hernia, Incisional hernia, Epigastric hernia, Spieghelel hernia, Grynfeltt hernia [Grynfeltt-Lesshaft triangle], Petersen hernia [Petersen gap], and Obturator hernia [3].

According to hernia frequency, 3-5% of people will develop a hernia in their lifetime. Men are more often affected than women [ratio 9: 1] because their abdominal wall is weakened by the blood vessels and nerves for the testicles and they are often exposed to greater physical stress at work [4].

At first, pulling pain occurs at the breaking point, especially when coughing or when lifting heavy loads. They usually go away as soon as the patient rests. Irritation of the peritoneum may cause nausea and vomiting, and in some cases dizziness and fainting [5]. Diaphragmatic hernias can only be determined on an X-ray or with endoscopy.

The greatest danger of a hernia is the entrapment [incarceration] of the abdominal organs [5]. Under increased pressure, the intestines very easily enter the wide canal formed by the peritoneum. If the pressure subsides, the canal is narrowed and the organs have

difficulty returning to their original position. Typical complications are:

1. Net entrapment
 - a. The greater omentum, which is well supplied with blood, lies in front of the abdominal organs and is often found as a hernia. If it is pinched, the blood circulation in the tissue comes to a standstill. The tissue that is no longer supplied with oxygen becomes necrotic.
2. Ileus
 - a. If a complete loop of the intestine is trapped, the contents of the intestine cannot be transported further. Intestinal obstruction [ileus] occurs.
3. Intestinal wall perforation
 - a. If the intestinal loop is trapped in such a way that the oxygen supply stops, necrosis of the intestinal wall with subsequent perforation can occur. The emptying of intestinal contents into the peritoneal cavity causes peritonitis [inflammation of the peritoneum].

Hernias do not heal by themselves because the hernial portal does not close on its own, but rather expands continuously. With the increasing enlargement of the hernial opening, the probability of entrapment increases rapidly. For this reason, hernial portals should be surgically closed or appropriately secured as soon as possible [e.g., the inguinal canal in men].

LITERATURE REVIEW:

A hernia can occur in different places. A distinction is made between different types, depending on the location of the hernia.

The inguinal hernia accounts for around 75–80% of all intestinal hernias and is therefore the most common form of hernia. Around 27% of men and 3% of women will develop an inguinal hernia at some point in their lives [6]. Because of their narrower inguinal canal, women are affected much less often than men. A distinction is made between medial [= direct] and lateral [= indirect] inguinal hernias.

For medial / direct inguinal hernia; this form of inguinal hernia is always acquired. It accounts for around 30–40% of all hernias and mainly affects older men. The hernial port lies in the area of the so-called Hesselbach triangle, a muscle-free area in the lateral groin. The hernial sac runs medial to the blood vessels in the lower abdominal wall [medial = towards the center of the body]. It penetrates the anterior

abdominal wall, which has been impaired by an acquired tissue weakness, vertically, i.e., directly [7].

On the other hand, for lateral / indirect inguinal hernia; this form of inguinal hernia can be both congenital and acquired. It accounts for about 60–70% of all hernias and primarily affects men. It occurs most frequently on the right side of the body [49%], less often on the left [36%] or on both sides [15%]. The lateral inguinal hernia does not emerge directly through the abdominal wall, but runs - indirectly - through the inguinal canal. The inner inguinal ring, the entrance to the inguinal canal in the area of the lateral inguinal fossa, serves as the hernial portal. On the outer inguinal ring, the mouth of the inguinal canal, the hernial sac then protrudes outwards. The lateral inguinal hernia can extend into the outer labia in women and into the scrotum in men. In these cases, one speaks of labial or scrotal hernias [8].

About 7% of all hernias are femoral hernias. This special form of the inguinal hernia is practically always acquired. Women are particularly affected [approx. 80%]. In addition to the female gender, risk factors include older age, previous pregnancy [s] and obesity [9]. In the femoral hernia, the hernial port is located below the inguinal ligament in the so-called lacuna vasorum, a passage for blood vessels and nerves that supply the thigh.

A femoral hernia is often recognized very late, not infrequently only at the point in time when complications are already present. This is due to the fact that the affected patients feel - if anything at all - only a diffuse, pressing pain below the groin [10]. In obese patients in particular, it is often difficult to see or feel a femoral hernia in the form of a swelling below the groin. The diagnosis is therefore often only made when the hernial sac is already in the hernial port has jammed. At this point there is a risk that the contents of the hernial sac [for example intestinal loops] will not be adequately supplied with blood as a result of the entrapment and will die. For this reason, a femoral hernia should always be operated on as soon as possible.

Incisional hernias occur after open surgical interventions on the abdomen in the area of the surgical scar. The frequency is around 10% of all abdominal operations [11]. Incisional hernias occur due to insufficient strength of the surgical scar. Favorable factors are wound infection, bleeding, wound healing disorders, poor general and nutritional status of the patient, special diseases such as diabetes or cancer, obesity, medication [especially cortisone

preparations], long-term nicotine consumption and disorders of collagen metabolism. An incisional hernia usually develops within the first year after an abdominal operation. The main symptom is the visible or palpable protrusion in the area of the still relatively fresh surgical scar on the abdomen [12].

Even if a hernia does not cause any symptoms, it should still be operated on, as it can lead to dangerous complications, especially the entrapment of parts of the intestine [13]. However, the original surgical scar should be healed beforehand, which is usually about six months after the procedure.

The epigastric hernia is a hernia of the viscera in the midline of the upper abdomen [between the lower sternum and the navel]. The hernial orifice lies in the area of the linea alba. The hernial sac can contain parts of the large network, in rare cases also parts of the small intestine. Risk factors for the development of an epigastric hernia are weak connective tissue and increased internal pressure in the abdomen [e.g., in the case of chronic coughing or heavy straining as a result of constipation], being overweight and frequently carrying heavy loads [14]. The epigastric hernia is usually visible and / or palpable. It can be accompanied by pain or not. Men and women are equally affected [15].

About 5% of all hernias are umbilical hernias. They are often congenital and therefore usually manifest themselves in infancy and childhood. Adults usually have acquired umbilical hernias, which - for example, in pregnant women or people who work hard - can be traced back to an increased internal pressure in the abdomen [16].

Since the tissue of the umbilicus is naturally less stable than its surroundings, it is a natural weak point in the abdominal wall. In an umbilical hernia, the hernial sac passes through the umbilical ring, an annular opening in the tissue around the umbilicus. The break becomes noticeable as swelling in the navel area, and pain may also be present. The hernial sac can emerge from the abdominal cavity originating lymph or adipose tissue, in some cases also parts of abdominal organs [17]. While entrapment is virtually non-existent in congenital umbilical hernias, this is quite possible with acquired umbilical hernias in adulthood. The latter should therefore be operated on as soon as possible. A congenital umbilical hernia usually heals spontaneously, so that an operation is usually not necessary here.

Parastomal hernias are intestinal hernias that develop next to an artificial stoma. The opening in the abdominal wall, which is necessary for the placement of the stoma, serves as a hernial port through which the hernial sac, possibly with intestinal or mesh parts, pushes outwards. Up to 50% of all ostomate wearers are affected by a parastomal hernia. This is the most common complication of the artificial stoma [18].

A parastomal hernia occurs when the scar in the area of the stoma opening does not solidify sufficiently. Favorable factors are wound healing disorders, bleeding and wound infections, as well as poor general and nutritional status of the patient, special diseases such as diabetes or cancer, obesity, medication [especially cortisone preparations], long-term nicotine consumption and disorders of collagen metabolism [19]. The symptoms of a parastomal hernia are palpable defects in the affected tissue or a protrusion in the area of the artificial bowel outlet that becomes clear when coughing or pressing.

If the esophageal hiatus is widened by a congenital or acquired weakness in the surrounding tissue, a diaphragmatic hernia can develop at this point. With this so-called hiatal hernia there is a partial or complete transfer of abdominal organs into the chest cavity [20]. Depending on the extent of the break, different forms are distinguished.

The most common form is the so-called axial sliding hernia, in which the stomach slides up a little so that the stomach entrance with the confluence of the esophagus [the so-called cardia] is displaced into the chest cavity [21]. A sliding hernia often causes little or no discomfort. The diagnosis is therefore often only based on an incidental finding. However, if the muscular locking mechanism between the esophagus and stomach no longer works properly due to the displacement of the stomach, gastric acid can flow back into the esophagus [reflux]. The irritation of the esophageal mucous membrane then leads to what is known as reflux disease with the typical symptoms of heartburn, swallowing disorders and pain in the upper abdomen. If a hiatal hernia causes such complaints, one tries to get a grip on them first through conservative measures such as weight reduction, diet changes, changes in lifestyle and drug treatment. If this does not work, the hernia should definitely be operated on as soon as possible.

In the rarer paraoesophageal hernia, the anterior section of the stomach pushes through the esophageal slit along the esophagus into the chest [the gastric entrance, the cardia, remains in the abdomen, unlike

the axial sliding hernia]. In some cases, this form of hiatal hernia also involves other viscera such as loops of intestine or parts of the large mesh in the chest. At first, those affected are often symptom-free, only later do symptoms such as a feeling of fullness, tenderness in the chest, difficulty swallowing or shortness of breath appear. Entrapment of the prolapsed organs can lead to life-threatening complications [22]. Therefore, the paraoesophageal hernia must always be treated by surgery as soon as possible.

In some cases, mixed forms of sliding hernia and paraoesophageal hernia also occur. The so-called upside-down stomach, also known as the thoracic stomach, is a rare form of paraoesophageal hernia. In this case, two-thirds of the stomach or more [up to the entire stomach] is moved into the chest cavity [23]. The stomach is twisted and the organs located in the chest cavity are displaced, especially the lungs and heart. Those affected therefore often suffer from cardiovascular complaints, shortness of breath, a feeling of fullness or pain in the chest. Just like the other paraoesophageal hernias, the stomach must be upside-down be operated on immediately to avoid dangerous complications.

Other rare types of hernia:

Internal hernias:

These forms of hernia are usually not visible to the naked eye or touch, because the hernial sac is located in peritoneum pockets within the abdominal cavity [24].

Spiegel's hernia:

It is an intestinal hernia in the area of the lateral abdominal wall. It breaks through the so-called Spiegel line, the muscle-tendon border of the transverse abdominal muscle [Latin: transversus abdominis] at the lateral edge of the straight abdominal muscle [rectus abdominis] [25].

Morgagni hernia:

Through a small hole in the diaphragm, the so-called Morgagni column, a bulging hernia before. The Morgagni hernia emerges next to the sternum [26].

Richter hernia:

In this fraction, also known as intestinal wall hernia only be turned-up intestinal wall portion forms the hernial contents within the sac. Since not the entire intestine is affected, the intestinal passage is preserved [27].

METHODS:

Study design:

This was an analytical cross-sectional study to spot light on the prevalence of different hernia types and to know which is the most common type, among Saudi Population.

Study setting:

The study was carried out at universities, hospitals and malls in KSA. Data were collected from general population during a period from May to November 2021.

Sampling and sample:

Participants were chosen via probability simple random sampling technique. Participants were selected from the general population. The final number of sample size was 500 participants. However, the study included 518 participants.

Inclusion criteria: General population, hernia patients

Instruments:

Data collection tool was self-designed and base on latest literature. It contained the following information: [1] Sociodemographic characteristics: age, gender, nationality and marital status; and [2] Disease related information: smoking, DM and associated between other disease, risk factors.

Statistical analysis:

Data was entered and analyzed using SPSS version 23. Descriptive statistics were performed and categorical data was displayed as frequencies and percentages while measures of central tendencies and measures and hernia were used to summarize continuous variables.

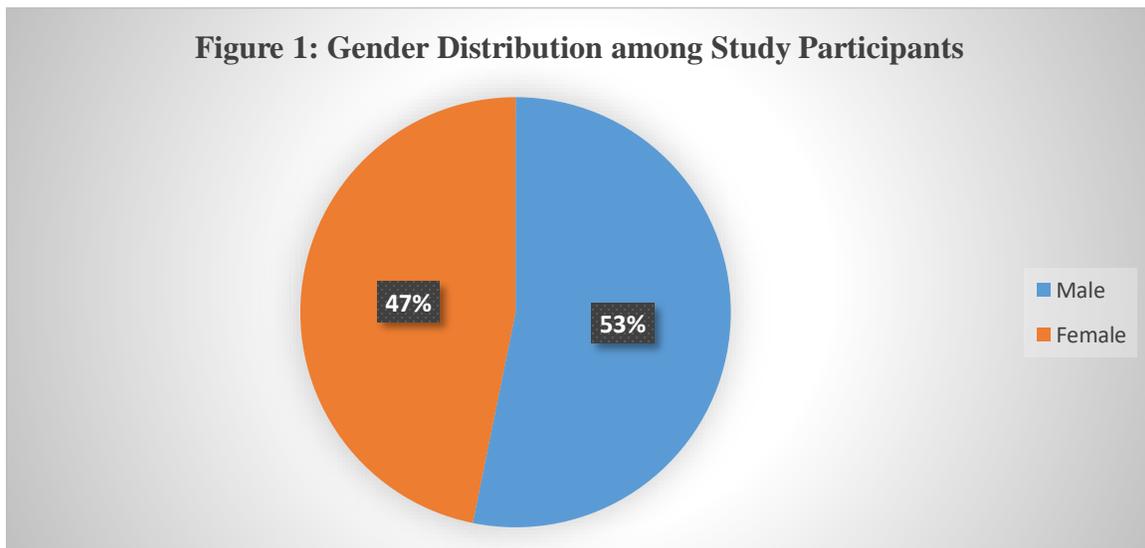
Univariate and multivariate analysis were performed to investigate association between age, gender, nationality and associated between other disease. statistical significance is set at a P value of 0.05 or less.

Permission and ethical considerations:

Administrative approval will be sought from the unit of biomedical ethics research committee Ethical approval was sought from the ethical committee of the faculty of medicine, king Abdul-Aziz university. An informed consent was sought from the participants.

RESULTS:

The study included 517 participants. The study aimed to determine the prevalence and distribution of hernia among population in Kingdom of Saudi Arabia. There were 275 males and 242 females included in this study. Male to female ratio is almost close. The most frequent age group was 20-30 years [n= 212, 41%] while the least frequent age group was more than 50 years of age [n= 37, 7.2%]. Figure 1 and 2 shows the gender and age distribution respectively while table 1 shows the distribution of age groups according to gender.



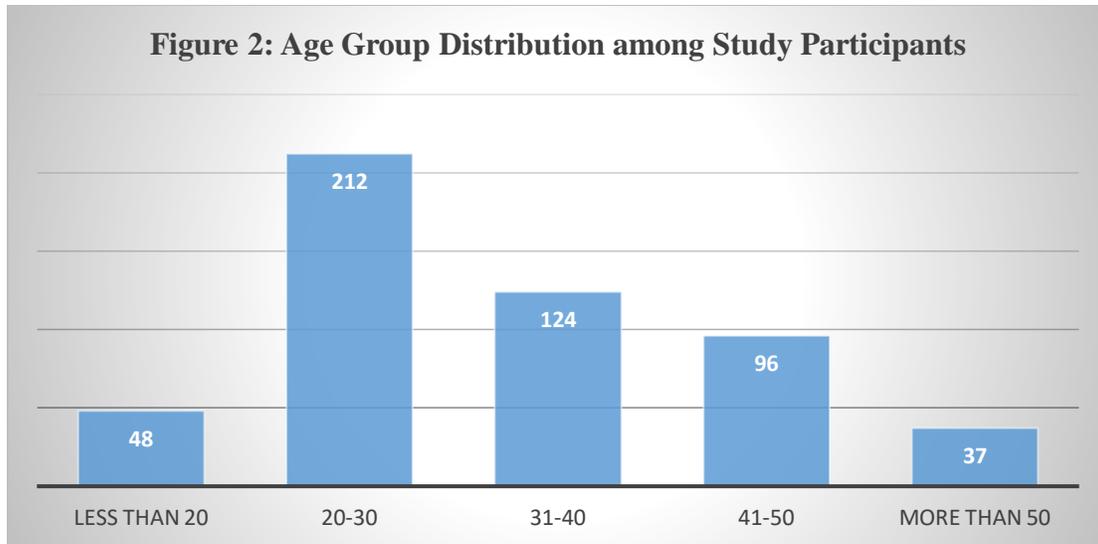
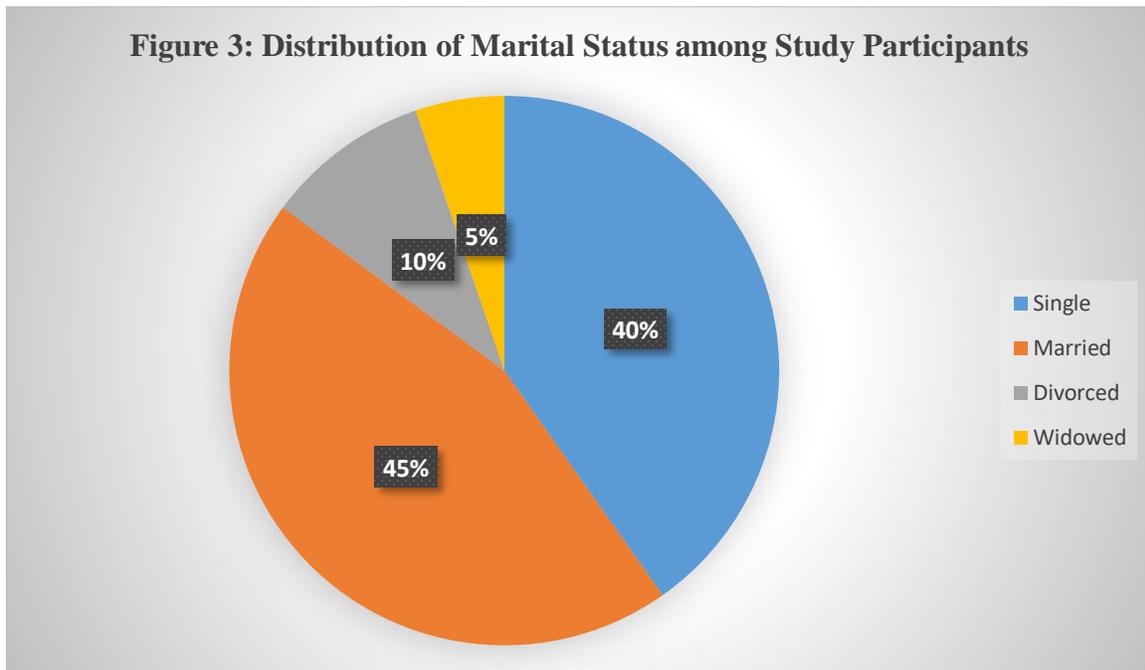


Table 1: Distribution of Age Groups According to Gender

Age group	Male	Female
Less than 20	25	23
20-30	131	81
31-40	56	68
41-50	47	49
More than 50	16	21

Most of study participants were Saudi [$n= 412, 79.7\%$] while the rest of participants [$n= 105, 20.3\%$] were non-Saudi. The marital status varied among study participants. The most frequent marital status was married [$n= 232, 44.9\%$] while the least frequent marital status was widowed [$n= 27, 5.2\%$]. Figure 3 demonstrates the distribution of marital status among study participants and table 2 shows the distribution of marital status by gender.



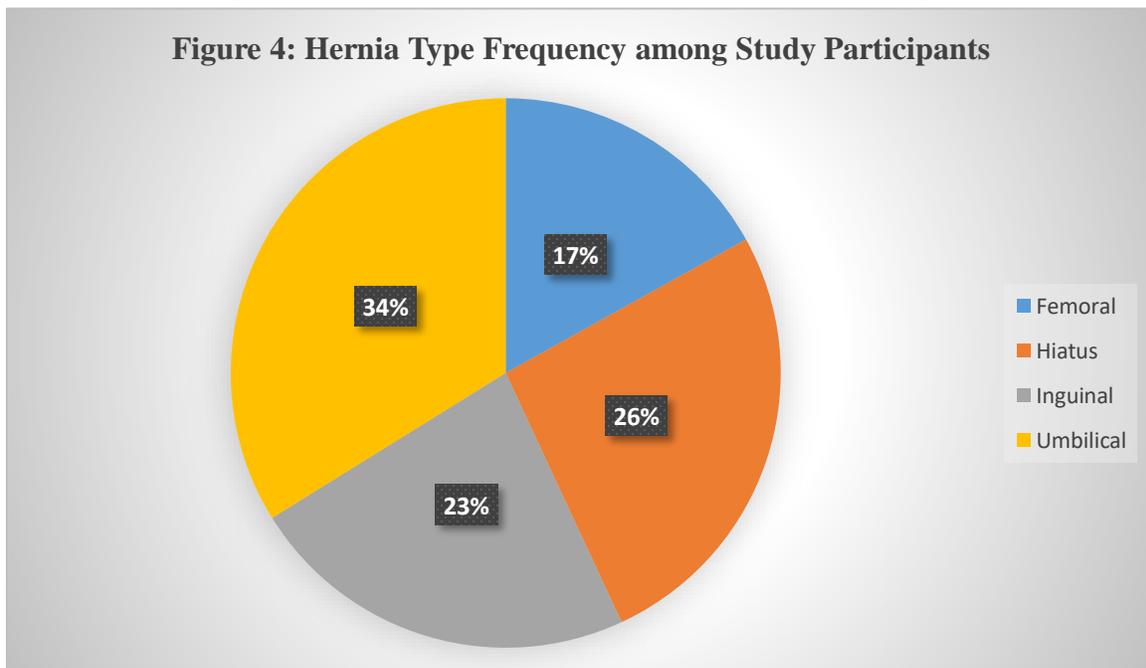
Marital status	Male	Female
Single	137	71
Married	103	129
Divorced	21	29
Widowed	14	13

Study participants were asked whether they had DM and about their smoking status. Furthermore, they were asked about risk factors for hernia such as chronic constipation, cough, weight lifting and having previous hernia. It was found that 120 participants had DM [23.2%] and there were 146 participants who are currently smoking [28.2%] while 57 participants were ex-smokers [11%].

On the other hand, there were 150 participants are suffering from constipation, 104 participants have cough, 134 participants perform weight lifting and 65 participants had previous hernia. All previous information are presented in table 3.

Variable	Male	Female
Diabetes mellitus	74	64
Smoking	Currently	31
	Ex-smoker	19
Constipation	74	76
Cough	51	53
Weight lifting	98	36
Previous hernia	31	34

There were 65 participants had previous hernia. However, the type of previous hernia varied among study participants. The most frequent hernia was umbilical hernia and the least frequent hernia was femoral hernia. Figure 4 shows the frequency of type of hernia among study participants and table 4 shows hernia type distribution by gender.



Type of hernia	Male	Female
Femoral	9	2
Hiatus	6	11
Inguinal	2	13
Umbilical	3	19

None of the risk factors seemed to have a statistically significant relationship with the type of previous hernia the participant had. However, umbilical hernia is statistically significant for females [P = 0.01].

DISCUSSION:

The abdominal hernia is a common condition between both males and females particularly the umbilical and para-umbilical hernia. Challenges in surgical practice in developing countries include delayed clinical presentation of patients [[28], [29]], and rather inadequate privately-funded health care financing.

Our study highlighted the prevalence of hernias and risk factors among population. In the current study, the most common site of abdominal hernias was umbilical, as they were found in 22 out of 65 participants who had previous hernia of cases followed by hiatus [17 participants]. The Natalie Dabbas study in the U.K found that, the relative frequency of different hernia types is: inguinal, umbilical, epigastric, incisional, para-umbilical and femoral [30]. The following are hernias quoted by various authors, their frequency is in decreasing order: inguinal [70–75%], femoral [6–7%], umbilical [3–8.5%] and finally the more uncommon forms of hernia [1–2%].

In a study in India [31], lingual hernias had the highest prevalence [21.8%] followed by incisional [15.7] and para-umbilical hernias [13.7%]. The results of this study showed that, hernias were significantly more prevalent in females than in males [63.4% vs. 36.6%]. Bedewi et al., in a study at King Saud University, Riyadh, Saudi Arabia, found the adult para-umbilical hernia positive cases among females was 24.9% and that among males was 23.3% [29]. According to the various literature, umbilical and para-umbilical hernias are up to five times more prevalent in women, indicating that pregnancy is a significant etiological influence [32].

Another study made by Natalie Dabbas in the UK was in complete contrast with this, showing that men in fact underwent more than twice as many umbilical and para-umbilical hernias [30]. Our study also found that 51.9% were obese, 10.9% of cases did regular exercises. Hernias were significantly affected by sex [p<0.05].

A study by Matar at King Khalid Hospital, Al-Kharj, in Saudi Arabia [33], found obesity was the most common predisposing factor of hernia cases [63%] and recurrence was more common in the obese patients. These findings were supported by Russell in 2000, who stated that obesity plays an important role as a risk factor for hernias. Increasing BMI and increasing age are associated with a higher prevalence and an increased risk of incarceration of non-inguinal abdominal wall hernias [34]. Another factor is that the musculature can be overburdened through increased food intake, as in cases of obesity. Adipose tissue will react to separate muscle bundles and layers, weaken aponeuroses, and can have the appearance of abdominal, hiatus, and direct inguinal hernias.

CONCLUSION:

The most common hernia type among the participant was the umbilical hernia and the least common type is the femoral hernia. Moreover, there were no significant hernia risk factors among the participants, except for the female gender, which had a statistically significant relationship with the umbilical hernia.

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