ORIGINAL ARTICLE

Prevalence and Associated Risk Factors for Inguinal Hernia among Prisoners Confined in Prisons of Punjab

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ABSTRACT
Objective: To determine the burden and associated risk factors of inguinal hernia among prisoners of Punjab.
Methods: A case control study was conducted, including all willing hernia patients (n=143) and age matched 143 healthy controls. A structured interview questionnaire was developed to collect elicit data on socio-demographic, potential risk factors and physical measurements.
Results: A total of 208 cases of inguinal hernia were recruited for this study. Prevalence was about 4 per 1000 population. Their mean age was 39 years (rang = 16-75 years). Fifty six percent cases entered with inguinal hernia and 44% developed inside prisons. Average time a prisoner patient living in prison with hernia was 47 months. Independent risk factors for inguinal hernia were rural background (OR = 1.7), poor education status (OR = 1.8), lifting heavy weights/mechanical work (OR = 3.2) and strain to pass urine (OR = 4.6). Obesity (BMI > 30) (OR = 0.36) and waist more than 102 cm (OR = 0.37) were protective.
Conclusions: Prevalence of Inguinal hernia was high among prisoners as the they have to wait for long periods for repair. Therefore, to avoid unwanted emergencies early repair of hernia cases is recommended.

Key Words: Inguinal hernia, prisoners, Punjab, Pakistan

INTRODUCTION
The word "inguinal" means groin. An inguinal hernia is a bulge in groin. The bulge is like a pouch made up of fat, folds of peritoneum and bowel in the middle of it that has slipped through a weak spot in the abdominal muscles into groin. Hernia can be pushed back or it reduces automatically in lying posture. When you bend and lift weight hernia can cause you uncomfortable. You may also feel difficult to perform day to day activities. Surgical repair is the only remedy[1]. Strangulation of inguinal hernia is a real emergency.

Inguinal hernia is one of the commonest surgical issue and abdominal wall hernia. requency is high among adult males(2). The prevalence of inguinal hernia is not known. However, it is estimated that about 500,000 cases of inguinal hernia approach medical professionals annually(3). According to old international surveys the prevalence of untreated inguinal hernia was 5–7% in males. However almost same percentage of male under go for surgical repair(3). In the United States, the number of work days lost are higher among inguinal hernia cases as compared to any other chronic digestive system illness. Approximately 400,000 people annually limit their activities significantly(3).

Untreated inguinal hernias patients can suffer from many complications; intestinal obstruction and strangulation. Risk of complications is highest among older males[4]. Inguinal hernias are common occurrences and significant clinical conditions. However, scarce data is available about the risk factors for inguinal hernia[5-9]. An increased risk of inguinal hernia with poor education and manual work was found in three case-control studies[6,7,10]. Rural background was found a risk factor among females[11]. Symptoms of prostatic hypertrophy were reported among men having hernias in another study[12]. Strenuous exertion was also found a risk factor[6, 7]. Other factors found likely associated with inguinal hernia are; constipation[13], ageing[2], chronic obstructive airway disease[14], abdominal surgery[15], family history[14], heavy weight lifting[16], smoking[17], straining during urination[18] and pelvic trauma[19]. However, risk for inguinal hernias was least among overweight men[5, 8].

There are 32 prisons in Punjab and presently accommodating about fifty thousand prisoners. Each prison has a prison hospital with medical and paramedical staff. Consultants from respective DHQ hospitals or teaching hospitals visit the prisons fortnightly to examine the prisoners enrolled by medical officer prison for consultant opinion. Sometime consultants advise referral of prisoner patients to outside hospital for surgery or specialized treatment. As per Pakistan prison rules, superintendent jail can refer a prisoner patient to outside hospital after getting permission from Secretary Home Department, Government of the Punjab. Superintendent jails submit cases for sanction to Inspectorate of Prisons Punjab, Lahore. Inspectorate of Prisons after scrutiny and fulfilling all formalities sends cases to secretary to Government of the Punjab Home department for grant of sanction to refer prisoners to outside hospital. In cases of routine surgical procedures where chances of any emergency are rare grant of sanction is not recommended. So sanction process takes many months or even considered un-justified. But in case of acute emergency superintendent jail by the advice of prison doctor himself is authorized to refer a prisoner to outside hospital for emergency treatment. Afterwards he gets formal sanction from secretary to Government of the Punjab Home department for said referral.

Prevalence of inguinal hernia basis on physical examination have not been assessed in Punjab prisons. Therefore, far risk factors of inguinal hernia have also not been evaluated in any prison population. In pursuance to receiving a reasonably high number of cases of inguinal hernia from prisons to Inspectorate of prisons, for grant of sanction to shift a prisoner for operation to outside hospitals. This study was conducted to assess the burden and associated risk factors of inguinal hernia among prisoners confined in prisons of Punjab and to formulate recommendations for timely identification and repair of hernia cases and prevention and control of unwanted emergencies.

MATERIALS AND METHODS

Information regarding cases of inguinal hernia was collected from all prisons of Punjab in January, 2012. Case of inguinal hernia was defined as a patient having swelling in both or one side of groin and consultant surgeon diagnosed him a patient of inguinal hernia. Type of inguinal hernia right, left, bilateral or recurrence of hernia was declared by surgeon on physical examination. During physical examination surgeons also recorded the presence of an umbilical hernia. Demographic information like age, sex, type of prisoner (under trial/convicted/condemned prisoner) and name of jail was recorded.

A case control study was conducted to identify the potential risk factors of inguinal hernia among prisoners. All willing hernia patients (n= 143) and age, sex and prison of confinement matched 143 healthy controls were included. A structured interview questionnaire was used to collect data on socio-demographic variables, potential risk factors and physical measurements. Demographic characteristics included in questionnaire along age were education (illiterate, primary, secondary or above), area of residence (urban or rural), marital status (married/unmarried/divorced/widow), number of children, age when hernia developed, hernia developed before coming to jail or inside the jail and time since development of hernia. Potential risk factors enquired were occupation (sitting office work/manual work/labor have a lot of heavy lifting), smoking (never, former, current), any addiction (injections, chars, heroin or alcohol), chronic cough, strain to pass urine, history of abdominal injury or surgery, constipation, haemorroids, diabetes, hypertension and hernia in blood relations. Physical variables; height (cm), weight (kg) and waist circumference (cm) were measured. Then body mass index [weight (kg)/ height (cm)] was calculated. According to the WHO classification participants were classified into categories of thinness. A person falls under thinness grade 1 (mild thinness) if BMI = 17–18.49kg/m^2, grade 2 (moderate thinness) BMI = 16–16.99kg/m^2, and grade 3 (severe thinness) BMI $\leq$16.0kg/m^2[20]. According to the current WHO recommendations for the Asia- Pacific region a person with BMI ≥23 is overweight and having obesity at BMI ≥25. (21, 22). However, a person with BMI 18.50 – 22.99Kg/m^2 is considered normal. Epi-Info software was used to analyze the data.

RESULTS

A total of 208 cases of inguinal hernia were enrolled in this study. Prevalence was about 4 per 1000 population. Mean age of cases was 39 years (range = 16-75 years). Age distribution of cases is shown in Table 1. Among them, 84% cases were in productive age group (21-50 years). Distribution of cases according to side of body is shown in Figure 1.

Eleven (5.3%) reported recurrence after repair, while 56% cases entered with inguinal hernia and 44% developed hernia inside jail. Furthermore, 80% prisoners developed inguinal hernia till 50 years of age (during productive age group). Average time a prisoner has to wait for repair was 47 months (range = 2 -192).

Risk factors for inguinal hernia were evaluated; these are shown in Table 2. Rural background, poor education status, lifting heavy weights/manual work, abdominal Injury & surgery and strain to pass urine were significantly associated risk factors of inguinal hernia. Constipation, hemorrhoids, chronic cough, chronic obstructive pulmonary disease and other family member (father, mother, brother or sister) have inguinal hernia were not significantly associated risk factors. Obesity (BMI > 30), obesity & over weight (BMI >23) and waist more than 102cm were protective against development of inguinal hernia.

Figure 1: Frequency of inguinal hernia according to body side.

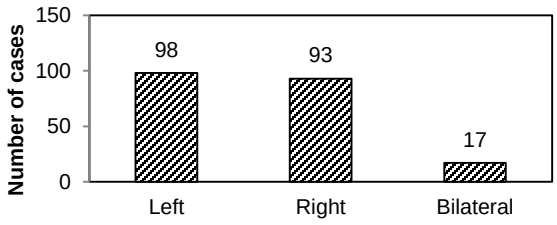

Table 1: Age distribution of cases of inguinal hernia.

Age group (years)	Frequency (%)	95% CI
≤21	3 (1.4)	0.3-4.2
21 to 30	66 (31.7)	25.5-38.5
31 to 40	68 (32.7)	26.4-39.5
41 to 50	41 (19.7)	14.5-25.8
51 to 60	18 (8.7)	5.2-13.3
61 to 70	10 (4.8)	2.3-8.7
≥71	2 (1.0)	0.1-3.4

Table 2: Risk factors of inguinal hernia among prisoners.

Risk Factors	OR	95% CI	p-value
Rural background	1.7	1.02-2.82	0.04
Poor education	1.8	1.05-3.05	0.03
Lifting heavy weights/ manual work	3.2	1.71-5.92	0.00
Strain to pass urine	4.6	2.43-8.66	0.00
Waist more than 102 cm	0.38	0.19-0.76	0.00
Obesity (BMI >30)	0.36	0.13-0.92	0.00
Obesity (BMI >25)	0.51	0.29-0.88	0.01
Over weight+ Obesity (BMI >23)	0.58	0.35-0.96	0.03
Family history	1.4	0.68-2.94	0.35
Constipation	1.12	0.65-1.94	0.67
Hemorrhoids	1.5	0.53-4.42	0.43
Chronic cough	1.6	0.87-2.96	0.12
COPD*	1.6	0.87-2.96	0.12
Smoking	0.94	0.59-1.5	0.81
Weight 71 - <82 Kg verses <71 Kg	0.78	0.44-1.38	0.40
Weight >82 Kg Verses 71 Kg	0.20	0.09-0.44	0.00
Abdominal injury & surgery	2.98	1.21-7.32	0.01

*Chronic obstructive pulmonary disease

DISCUSSION

There is scarce literature regarding risk factors of inguinal hernia in general population[11]. This study indicates how commonly inguinal hernia cases are in Punjab Prisons and which are their risk factors. The prevalence of inguinal hernia was 4 per 1000 prison population. Most of the hernia cases (84%) were between 21 – 50 years of age. Prevalence is progressively decreasing after 50 years of age. This finding is not consistent with the findings in other studies. Because according to other studies prevalence of inguinal hernias is too high and the risk is three times high among older adults[11]. Another study showed that prevalence rose markedly with age[12]. It may be due to that major bulk of prison population (90%) is between 20 to 50 years of age. Above 50 years of age there is only 8% population. Among prisoner patients 47% have left inguinal hernia, 45% right and 8% bilateral inguinal hernia. Prevalence of inguinal hernia according to body side is not discussed in any past study. All hernia patients are male. No female prisoner was suffering from inguinal hernia at the time of study. This finding is consistent with other two studies those have shown too high incidence of inguinal hernia among men than women[4,12]. Another explanation of this finding is that population of female prisoners is only 1% though female population in province is 52%. Many risk factors for inguinal hernia are evaluated; rural background, poor education status, lifting heavy

weights/manual work, abdominal Injury & surgery and strain to pass urine are significantly associated risk factors of inguinal hernia. Poor education and manual work have already been identified as an increased risk of inguinal hernia in two Spanish hospital-based case-control studies[6, 7] Rural background was found a risk factor among females in a previous study[11]. All these three factors are interlinked. People living in rural areas are often poorly educated and involved in manual work to earn bread for their family. Symptoms of prostatic hypertrophy (strain to pass urine) were reported among men in another study[12]. Lifting heavy weights/manual work and strain to pass urine might increase intra-abdominal pressure. However, other factors Smoking, constipation, haemorrhoids, chronic cough, chronic obstructive pulmonary disease that might increase intra-abdominal pressure is not associated with inguinal hernia. Previous studies have also found that these factors were not associated with inguinal hernia, with the exception that constipation was risk factor[5,7,8,12]. However in some individual studies Haemorrhoids[5] and smoking[13] were found associated with inguinal hernia. Other family member (father, mother, brother or sister) has inguinal hernia is not significantly associated risk factor. This factor was not discussed in other studies. Obesity (BMI > 30), obesity & over weight (BMI >23), waist more than 102cm and Weight >82 Kg Verses 71 Kg are found protective against development of inguinal hernia. Many studies have found that overweight was associated with lower risk. A community based survey among men in Israel and hospital-based case-control study among women in the Netherlands have also suggested lower risk of inguinal hernia among overweight people[5,8,11,12]. Protective effect of high fat mater is might be that abdominal wall musculature among heavier men, may be strengthened by presence of excessive fat, which provides a stronger barrier against herniation. However further research is recommended to establish the real association of overweight and obesity with inguinal hernia. This study has some limitations. The case definition is based on diagnoses of surgeon visiting jail hospital fortnightly or on call basis from concerned DHQ Hospital or Teaching Hospital. Often medical officers of surgical department visit jail hospital and considered consult. So cases diagnosed by the visiting doctors are reported by medical officer prison as cases of inguinal hernia without their own input. Free movement of prisoners is not allowed. Any prisoner is brought to jai hospital by warden incharge of barrack. For surgical opinion prisoners are enrolled by prison doctor or dispenser. In this situation there are chances that some hernia case were missed to examine and diagnose. Inguinal hernia is a common condition among prisoners. Patients have to wait for long time for repair. To avoid unwanted emergencies early repair of hernia cases is recommended.

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