

**Research Article****Prevalence of Different Types of Gallstone in Relation to Age in Sudan**Saadeldin A Idris<sup>1\*</sup>, Mohammed HF Shalaye<sup>2</sup>, Kamal Elzaki Elsiddig<sup>3</sup>, Aamir A Hamza<sup>4</sup>, Mohamed M Hafiz<sup>1</sup><sup>1</sup>Associate professor of Surgery, Alzaeim Alazhari University, Faculty of Medicine, Khartoum, Sudan<sup>2</sup>Professor of Biochemistry, National College for Medical and Technical Studies, Khartoum, Sudan<sup>3</sup>Associate professor of Surgery, University of Khartoum., Faculty of Medicine, Khartoum, Sudan<sup>4</sup>Associate professor of Surgery, Bahri University, Faculty of Medicine, Khartoum, Sudan**\*Corresponding author**

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**Abstract:** Gallbladder stone disease accounts for many hospital admissions and surgical interventions in our local population. Our main objective was to evaluate the relationship between age as a risk factor and gallstones in our local population. A cross-sectional study included all cholecystectomized patients after acceptance of the pre-given informed consent. The stones were divided into 3 groups depending upon their colours: pale yellow and whitish stones as cholesterol calculi, black and blackish brown as pigment calculi and brownish yellow or greenish with laminated features as mixed calculi. The collected data was handled statistically using SPSS computer program version 21. The stone-types were correlated with patients' age groups using the Student's test and/or Chi-square test when appropriate. The confidence level was set at 95% CI and p values less than 0.05 were statistically considered significant. The study included 94 patients (6 (6.4%) males and 88 (93.6%) females) with female to male ratio of 14.7:1; Chi-square = 1189.64,  $p < 0.0001$ . Their mean age was 45.9 years (SD  $\pm$  10.3) (Range, 27 to 80 years). The majority of patients were from the age group 31-50 years (64 patients (68.08%)), while it was rare in patients  $\leq 30$  and elderly patients  $> 70$  years. The pigment calculi were the commonest as found in 48 (51.07%) patients. The highest incidence of gallstones was found in age group 41-50 and 31-40 years in 43.6% and 24.5% respectively ( $p < 0.05$ ). From the study it can be concluded that age appears to have an effect on the incidence of gallstone disease.

**Keywords:** Gallstones (GS); Pigment stones (PS); Mixed stones (MS); Cholesterol stones (CS); Age.

**INTRODUCTION:**

Cholelithiasis is common with the incidence ranging from 10% to 20% of the world population [1]. The incidence is four times higher in women than in men with high prevalence among younger age group [2]. However, the true prevalence of the disease remains hard to derive as the majority of patients remain asymptomatic [3].

The traditional risk factors for gallstone disease (GSD) are the four 'F's- 'female, fat, forty and fertile' - but age is additional risk factors in Western countries [4]. Gallstone disease before 20 years of age is a rare occurrence [5]. The increased incidence of gallstones with age is seen across all ethnic groups [4, 5].

Gallstones (GS) are seen in all age groups but the incidence increases with every decade of life and they were found to be most prevalent in 4th and 5th decade of life [6]. Twenty to thirty percent of western people aged 65 and around 10% of non-western population same ages have been affected by gallstones [7-9].

Our main objective in the current study was to evaluate the relationship between age as a risk factor and gallstones in our local population.

**PATIENTS AND METHODS**

A cross-sectional study was conducted in Khartoum teaching hospital during the period from January 2010 to December 2011. It included all patients treated by cholecystectomy after acceptance of the pre-given informed consent. Using a predesigned and tested questionnaire the data was collected and spread in master sheet. It included personal data, Ultrasound findings, and stone number, size and colour. The stones were divided into 3 groups depending upon their colors: pale yellow and whitish stones as cholesterol calculi, black and blackish brown as pigment calculi and brownish yellow or greenish with laminated features as mixed calculi. The collected data was entered computer and managed statistically using SPSS computer program version 21. Numerical data was expressed as a mean  $\pm$  SD. The stone-types were correlated with patients' age groups using the Student's test. The confidence level was set at 95% CI and p values less than 0.05 were statistically considered significant.

**RESULTS**

Ninety-four patients were enrolled into this study {6 (6.4%) males and 88 (93.6%) females} with female to male ratio of 14.7:1; Chi-square = 1189.64,  $p < 0.0001$ . Their mean age was 45.9 years (SD  $\pm$  10.3) (Range, 27 to 80 years).

The majority of patients were from the age group 31-50 years (64 patients (68.08%)), while it was rare in patients  $\leq 30$  and elderly patients  $> 70$  years.

The stones were solitary in 33 (35.1%) patients. The pigment calculi were the commonest as found in 48 (51.07%) patients (Fig.1). The highest incidence of gallstones was found in age group 41-50 and 31-40 years in 43.6% and 24.5% respectively ( $p < 0.05$ ).

Pigment and cholesterol stones were predominantly found in the age group 41-50 years, 22 (23.4%) and 9 (9.6%) respectively ( $p=0.01$  and  $p=0.03$  respectively). Whereas, mixed stones were mainly found in 31-40 and 41-50 age groups.

Cholesterol stones were not found in young aged ( $\leq 30$  years) and elder ( $>70$  years) patients (Table 1).

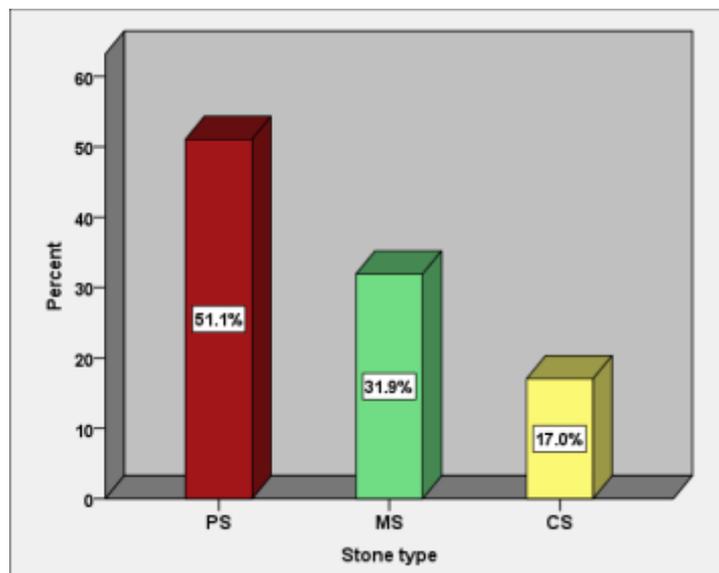


Fig. 1: Gallstone types in the studied groups (n=94)

Table 1: Incidence of different types of gallstones in relation to age in patients with symptomatic calcular cholecystitis in the studied groups (n=94)

Age group (years)	Cholesterol stones (CS)	Mixed stones (MS)	Pigment stones (PS)	Total (%)
$\leq 30$	0 (0.0%)	1 (1.1%)	5 (5.3%)	6 (6.4)
31-40	3 (3.2%)	10 (10.6%)	10 (10.6%)	23 (24.5)*
41-50	9 (9.6%)*	10 (10.6%)	22 (23.4%)*	41 (43.6)*
51-60	2 (2.1%)	6 (6.4%)	6 (6.4%)	14 (14.9)
61-70	2 (2.1%)	1 (1.1%)	5 (5.3%)	8 (8.5)
71-80	0 (0.0%)	2 (2.1%)	0 (0.0%)	2 (2.1)
<b>Total</b>	<b>16 (17%)</b>	<b>30 (31.9%)</b>	<b>48 (51.1%)</b>	<b>94 (100)</b>

\* Significance at  $p < 0.05$

## DISCUSSION

Incidence of gallstones was found many folds higher in females as compared to males and this increase was more in middle age groups. These findings were consistent with past studies [10-13].

Reason for this increment is well understood now and it is due to elevated estrogen levels, which increase cholesterol excretion in bile by causing its super saturation with cholesterol [13].

A study in Taiwan confirmed that increasing age had a direct relationship with the development of gallstones simply due to the long-term exposure to other risk factors irrespective of locality or standard of living [4].

A Danish study showed that an increased incidence of GSD in patients  $\geq 45$  years compared with those aged  $\leq 35$  years, while the differences in GS incidence between sexes decreased with advancing age [14]. Our study found the rarity of GS in extremes of age.

The incidence of GS in this study was higher in age group 41-50 years. This finding is in agreement with Indian study [11]. In contrast to study in Nepal by Pradhan SB et al. [15] the most commonly involved age group for cholelithiasis (32.5%) was found to be 30-39 years.

In the present study efforts have been made to determine most common variety of stones present in gall bladder either single or multiple. According to our findings multiple stones were mostly present in patients with gallstones, which were in accordance with previous studies [12, 13].

In industrialized western countries gallstones are of three varieties; most commonly they are composed of cholesterol followed by pigment and mixed stones [4, 12]. According to our findings pigment calculi were the commonest gallstones, and it occurs mainly in the age group of 41-50 years, followed by MS then CS, these findings were in accordance with study in Libya [10]. Similarly pigment gallstone remains the major component of gallstones in Taiwan [16]. This finding is in contrary to earlier reports that concluded the CS is a major component of gallstones in western populations [4, 12]. Also the incidence was different from other Indian reports when MS was the major component of gallstones followed by PS and CS [11, 17]. The differences observed between nations may be attributed to different dietary conditions and habitats and different socio-economic status of the people.

This study was not constructed to explore in depth the pathogenesis of pigment gallstones as a major component of gallstones in the current study due to a lack of epidemiological studies in our country. Although the dominancy of pigment stones in our study may be explained by the high incidence of tropical diseases especially malaria in our region, as it is one of the major factors causing pigment stones that precipitate increased production of bilirubin. Another factor that augments increased production of bilirubin is stasis of bile flow that predisposes to infection, and subsequently to pigment stone formation [3, 18].

According to our findings CS also was commonest in the age group 41-50 years and not found in very young and elder patients this was in accordance with other [11].

Limitation of this study was a small sample size and it did not represent the whole population; it was based only in the patients of single tertiary hospital of Khartoum, Sudan.

## CONCLUSION

Age appears to have an effect on the incidence of gallstone disease. Sudanese subjects are quite different from those shown in western countries suggesting that the recent increases in living standards and prosperity in Sudan have not yet led to cholesterol becoming the major gallstone component. Our study opens the forum of discussions and should be continued in more advanced and modified phases. Further studies will be highly recommended on the basis of our findings.

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