

ORIGINAL ARTICLE

An Epidemic Investigation of Abdominal Pain Related with Liver infection

Ghanshyam Ahirwar¹, Sanjeev Kumar¹, Manohar Bhatia¹, Paharam Adhikari¹, Shubhanshu Gupta¹,
Rajju Tiwari² and Sarvesh Kumar Awasthy¹

¹Department of Community Medicine,²Biochemistry, Govt. Medical College Datia, Madhya Pradesh, India.

Abstract:

Objectives: Objectives of the investigation was to measure the magnitude of problem, find out cause and source of illness, and to suggest measures for prevention & control. **Methods:** 36 cases history from their hospital records were collected. Rapid house - to - house survey of all the 36 houses was carried out. **Results:** Most of cases were found to have single organism staphylococcal infection in liver abscess. In our study most of liver abscess were found in non alcoholics about 59% were non alcoholics predicting non alcoholics cause most probably. About 88% of cases were using common pipe lined water and only 12-13 % were using home bore water. **Conclusion:** Pipelined water was not chlorinated, further this water was getting mix with dust and mud due to leakage of underground pipe line. Further stool and water sample examination predict that it was due to contaminated water supply. No mortality was reported.

Keywords: Staphylococcal Infection ALA (Ameobic Liver Abscess), PLA (Pyogenic Livere Abscess), Liver Abscess, Contaminated Water

Introduction:

A liver abscess is defined as a pus-filled mass in the liver that can develop from injury to the liver or an intra abdominal infection disseminated from the portal circulation [1]. Liver comprises 48% of all the visceral abscesses [1]. Liver abscess is the condition which involves collection of purulent material in liver parenchyma due to bacterial, parasitic, fungal, or mixed infections. It is common in India with 2nd highest incidence due to poor sanitation, overcrowding and inadequate nutrition [2]. Worldwide, approximately 40-50 million people are infected annually with amoebic abscesses. Prevalence of

infection is higher than 5%-10% in endemic areas [3]. Various studies from rural areas of Central and South America, India, and the tropical areas of Asia and Africa have reported prevalence rate as high as 55% [4,5]. Pyogenic liver abscess has an estimated global incidence of 1.1-2.3 per 100,000 person-years and in United States, the incidence is approximately 3.6 per 100,000 and has been rising [6]. Broadly divided into amoebic liver abscess (ALA) and pyogenic liver abscess (PLA) with majority of amoebic etiology in developing countries and pyogenic in developed countries [7]. Amoebic and pyogenic abscess share many clinical, laboratory and imaging feature, but they exhibit significant difference in epidemiology and treatment. Hence the differentiation is essential for effective treatment [8].

If the source is an anaerobe, most infections are caused by *Entamoeba histolytica*. The pyogenic abscesses are usually polymicrobial, but some organisms are seen more commonly in them, such as *E.coli*, *Klebsiella*, *Streptococcus*, *Staphylococcus*, and anaerobes. While the incidence is low, it is essential to understand the severity of these abscesses because of the high mortality risk in untreated patients [9]. If strep or staph is isolated solely, the focus should be on finding another source of infection (endocarditis) that has hematogenously spread to the liver.

Klebsiella pneumoniae is a prominent etiology in Southeast Asia and is thought to be related to or associated with colorectal cancer there as well [10,11]. It is usually present with no hepatobiliary system disease and is exclusively monomicrobial. It happens in a background of diabetes and is more severe

than other forms of bacterial abscesses, possibly because of enhanced virulence factors of the bacteria [12].

As Rural Datia of M.P. is one of the known area for waterborne epidemics, hence by keeping in mind with the objectives to measure the magnitude of problem, find out cause and source of illness, and to suggest measures for prevention & control of the reported cases of the liver abscess, the team visited the affected villages on 07 January 2021.

Methods:

This was an Observational Cross sectional study, conducted by an epidemic investigating team visited the affected town Bhaguapura village of Distt Datia ,M.P. having population of 8000, on 07th Jan 2021 with a detail investigation of the circumstances done and all the relevant information was captured during visit . Relevant preliminary data were collected on data sheet from the local Residents, present cases with the help of local authorities like ASHA, AWW and Gram panchayat secretary, from all 36 cases history from their hospital records were collected. Medicine specialist along with local Medical Officers examined the cases. Epidemic investigating team checked the documentation like abdominal USG, CBC and Pus culture collected from liver abscess of those who have sought necessary medical or surgical care elsewhere. Again Sample of stool from each patient and sample of water from each affected house were collected and sent for further microbiological assessment at microbiology laboratory of GMC Datia, Cases and prevailing factors were examined, samples for lab investigations were taken and relevant data were collected. First case detected on 04 December 2020, aged 30 years resident of Bhaguapura he complaint of abdominal pain and low-grade fever. He reported to private hospital in Gwalior, he again went to same hospital about 1 month later then ultrasound was done, USG findings were suggestive of mild hepatomegaly with evolving liver in right 91cc and left 108 cc with thick internal content and minimal pleural effusion on right side, he was operated for liver abscess and pus culture was done. Pus culture was found to be

positive with staphylococcus aureus. Later the patient recovered. No any death reported till now from this condition in this area.

Observation and Results:

Index case: First case detected on 04 December 2020 [13], aged 30 years resident of bhaguapura he complaint of abdominal pain and low grade fever. He reported to private hospital in Gwalior, he again went to same hospital about 1 month later then ultrasound was done, USG findings were suggestive of mild hepatomegally with evolving abscess in right 91cc and left 108 cc with thick internal content and minimal pleural effusion on right side, he was operated for liver abscess and pus culture was done. Pus culture was found to be positive with staphylococcus aureus. Secondary cases: following the first case [13], many more cases came out with similar complaints of low grade fever and abdominal pain. All are of middle aged group except few of old age group. Some are alcoholics and majority are non-alcoholic male and female distribution are mixed. All were treated in hospitals. All were done routine investigation like CBC, LFT, RFT, Widal test, urine routine and microscopy and ultrasound. When USG done all were found to have liver abscess. Since first case in august, five to six cases reported every month till now. In all 36 cases, pus drainage was done by their hospitals and investigated for pus culture and sensitivity, out of then 25 was found to have staphylococcal infection, 3 cases for mixed infection and 8 cases were having sterile pus culture. None of them were having amoebic evidences. About 88% of cases were using common pipe lined water and only 12-13 % were using home bore water which was also occasional, further we found that pipelined water was not chlorinated, further this water was getting mix with dirty and mud due to leakage of underground pipe line. Out of 36 cases 15(41%) were alcoholics and 21(59%) were non alcoholics.

A total of 36 patients, 28 (76%) males and 8 (24%) females were enrolled in the study. Male to female ratio was 2.85:1. Maximum number of cases were seen in the age group of 40-50 years. The mean age of the patients was 42.8 years (range: 18-63 years) (Table 1). Etiological analysis of liver abscess (on the basis of

amoebic serology and pus culture) revealed that 8% were of amoebic type as per stool culture findings (n=3), mixed bacterial infection was in 8% (n=3) 69% staphylococcal infection as per pus culture finding(n=25), and 23% were have sterile pus culture might be due to prior emperical antibiotics therapy. Mortality rate in present series was none. Pain in abdomen & the fever was (100 %). heaptomegally (81%) was the most common per abdominal examination finding followed by

Abdominal tenderness (64%). 42 % cases were found anorexic.28% cases developed right sided pleural effusion while 22% patients developed ascitis as complications. On ultrasound examination, majority of cases get involvement of right lobe (72% cases), while left lobe abscess was only in 17% and remaining cases were found to have involvement of lobes with multiple abscesses (both the lobes).

Table No.1: showing result of microbiological test assessment of pus, stool and water

Sr no.	Name of test	Number of sample	Staphylococcal positive	Mixed bacterial growth	Amoebic positive	Sterile
1	Pus culture	36	25 (69%)	3(8%)	0(0)	8(23%)
2	Stool microbiology	36	23(65%)	6(16%)	3(8%)	4(11%)
3	Water microbiology	36	19(52%)	5(14%)	11(31%)	1(3%)

(The chi-square statistic is 18.6. The p-value is .004. The result is significant at $p < .05$)

Table No. 2: Demographic profile of liver abscess patients

Age and Sex Parameters		Ameobic Liver Abscess (ALA)	Pyogenic Liver Abscess (PLA)	TOTAL
Mean age (years)		39.6	43	42.8
Age range(years)		18-63	18-63	18-63
Sex	Male	3(8%)	25(70%)	28(76%)
	Feamle	00(0%)	08(22%)	08(24%)

Table No. 3: Clinical features of liver abscess patients

Sigh and symptoms	ALA (N=3)	PLA(N=33)	TOTAL(N=36)
Fever	3(100%)	33(100)	36(100%)
Pain abdomen	3(100%)	33(100%)	36(100%)
Vomiting	2(67%)	8(24%)	10 (28%)
Nausea	1(33%)	6(18%)	7(19%)
Jaundice	2(67%)	5(15%)	7(19 %)
Cough	1(33%)	9(27%)	10(28%)
Abdominal tenderness	3(100%)	20(61%)	23(64 %)
Hepatomegally	2(67%)	27(82%)	29(81%)
Anorexia	2(67%)	12(36%)	14(42 %)
Pleural effusion	1(33%)	9(27%)	10(28 %)
Ascitis	0(0%)	8(24%)	8(22%)
Diarrhoea	2(67%)	8(24%)	10(28 %)

Table No. 4: USG findings of liver abscess patients

Sr.No.	Liver Lobe	Proportion
1	Right lobe	26(72%)
2	Left lobe	06(17%)
3	Both lobe (multiple abscess)	04(11%)

Discussion:

In our study most of cases were found to have single organism staphylococcal infection in liver abscess, in a study conducted by Abbas et al. noted that of 67 patients admitted for liver abscesses in the Middle East, 56 were due to pyogenic causes with most cases due to *Klebsiella pneumonia* [14]. In our study predominantly male were affected, out of 36 cases 8 were female and 28(76% were males and Male to female ratio is 2.85:1. Most studies show a male majority. a study conducted by Kaplan GG et al titled, "Population-based study of the epidemiology of and the risk factors for pyogenic liver abscess also shows male majority [15]. An another study conducted by Vineet Jain et al shows a total of 50 patients [16], in whome 41 (82%) were males and 9 (18%) were females with Male to female ratio of 4.5:1. In our study most of liver abscess cases were have pyogenic contrast to study which shows that in tropical developing countries most of liver abscess are cases of amebic abscess [17].

Our these finding are also in contrast with study of previous series on ALA by Vineet Jain et al [16] and Sharma et al, Mukhopadhyay et al and Ghosh et al.[16,18,19,20] . In our study the mean age of the patients was 42.8 years which was in accordance with Sharma et al and Mukhopadhyay et al who reported it to be 41, 40.5 and 43.64 years, respectively [18,19,20,21]. Highest incidence of liver abscess was seen in fifth decade of life with similar finding in ALA cases but PLA was present in all age groups in equal frequency. However, studies from west where PLA are more common, average age is above 60 years [21,22, 23].

In our study there are 41% cases those are alcoholics in accordance with study conducted by Islam QT et al which showed that indigenous alcohol has association

with the development of pyogenic liver abscess [24].

In our finding in contrast with study of Vineet Jain et al where alcohol consumption was seen as a major risk factor for amoebic liver abscess 58.4% patients of ALA were exposed to it [16], however only 14.2% of PLA cases were found alcoholic. Alcohol suppresses function of Kupffer cells (specialized macrophage) in liver which has important role in clearing amoeba. The mean age of patients in our study was 42.8 years which was similar to study conducted by Vineet Jain et al [16] i.e. 41.8 year mean age. Another study conducted by Sharma et al, Mukhopadhyay et al and Ghosh et al who reported it to be 40.5, 43.64 and 41 years, respectively [18-20]. Highest incidence of liver abscess was seen in fifth decade of life with similar finding in ALA cases but PLA was present in all age groups in equal frequency. However, studies from west where PLA are more common, average age is above 60 years [21-23].

In present study most common symptoms are fever and pain in abdomen in almost all cases (100%) similar to study conducted by Vineet Jain et al 94% and 96% respectively [16]. Ghosh et al reported it to be present in 94% and 99% whereas various other studies quote it in range of 67-87%, and 62-94% respectively [16-18].

Nausea and anorexia were other significant symptoms present in 19% and 42% patients overall with more frequency in ALA. Vineet Jain et al in their study reported nausea and anorexia in 48% and 50% percent respectively with more frequency in ALA. Similarly, Ghosh et al in their study reported 93% patients with anorexia and 54% with nausea and vomiting [20].

Cough and jaundice were another uncommon symptom which were present in 28% and 19 % patients similar to the study conducted by Vineet Jain et al where 22% and 18% were reported both respectively [16]. Jaundice

was reported in 26% of patients by Ghosh et al [20]. In other studies, from India, it was reported in 45-50% of patients [25]. But with availability of good antimicrobial therapy, it has become less common. Diarrhea was seen in 28% patients in the present study, but more frequent in ALA, 67% which was about 24% in study conducted by Vineet Jain et. al. [16]. Similarly reported by Ghosh et al in 23% [20]. We reported hepatomegaly in 64% cases overall 100% in ALA and 61% in PLA cases respectively. Similar trend was also reported in study conducted by Vinnet Jain et al i.e., 80% overall [16]. Ghosh et al [20] also reported it in 89% cases which is similar to present study whereas Das et al found it in only 40% cases which is contrary to present study [18,26].

Conclusion:

This study was conducted in 36 cases with liver abscess, which can be considered as a tip of an iceberg. It is endemic in tropical countries like India. In present study, PLA is much more common than ALA with male preponderance. Despite all the limitations in this study, the following conclusions can be drawn, that both ALA and PLA have almost similar clinical features. Mean age of presentation is in fourth decade, however the disease can present in any age group. Poor sanitation, over-crowding and inadequate nutrition could be the contributing factors. The Brief points of the study-

1. Since sudden reporting of first case in august 2020, many more cases reported, each month about 5-6 cases were reported suggestive of sudden outbreak then constant rate of spread

of infection till now this type of spread pattern rule out the possibility of single exposure/point source.

2. All members of same family were not reported as case, children were not affected. So person to person spread is very less likely to be involved.
3. This outbreak continues since august till now with constant rate of cases spread, scattered all over village, with no specific area, suggestive of some Common source, continuous or repeated exposure.
4. We found that all houses are consuming common water that is supplied from direct boring, through pipe line, without chlorination or any kind of water treatment.
5. From resident we came to know that at multiple site there are cracks in pipe line and at few points there is mixing of dirty water in pipe line too.
6. Most possibility is of contaminated water drinking leading to amebic followed by staphylococcal infection in coarse. Further investigation of stool sample and water sample, majority of sample confirms the presence of staphylococcal growth. It further suggests the contaminated water supply in village Bhaguapura.

Conflict of Interest - Nil

Sources of Support - Nil

References

1. Dori F, Zaleznik, Dennis L, Kasper. Liver abscess. In: Braunwald E, Fauci AS, Kasper DL, Hauser SL, Longo DL, Jameson JL, eds. *Harrison's Principles of Internal Medicine* 15th ed. McGraw- Hill Inc: New York. 2001;1:832-833.
2. Channanna C, Rehman FU, Choudhuri B, Patil A. A clinical study, diagnosis and management of Liver Abscess at VIMS, Bellary. *Journal of Evidence Based Medicine & Health Care*. 2014; 1:668-685.
3. Stanley SL Jr. Amoebiasis. *Lancet*. 2003;361:1025- 34.
4. Haque R, Duggal P, Ali IM, Hossain MB. Innate and acquired resistance to amebiasis in Bangladeshi children. *Journal of Infectious Disease* 2002;186:547-552.
5. Ralston KS, Petri WA Jr. Tissue destruction and invasion by *Entamoeba histolytica*. *Trends in Parasitology* 2011;27:254-263.
6. Goldman L, Schafer AI. Bacterial, parasitic, fungal and granulomatous infections. In: Goldman-Cecil Medicine Book. 25th ed. Elsevier; 2016;1:375.
7. Ochsner A, De Bakey M, Murray S. Pyogenic abscess of the liver: II. An analysis of forty-seven cases with

- review of the literature. *American Journal of Surgery* 1938; 40(1):292-319.
8. Siddiqui MA, Ahad MA, Ekram AS, Islam QT, Hoque MA, Masum QA. Clinico-pathological profile of liver abscess in a teaching Hospital. *Journal of Teachers Association* 2008;21(1):44- 49.
 9. Czerwonko ME, Huespe P, Bertone S, Pellegrini P, Mazza O, Pekolj J, de Santibañes E, Hyon SH, de Santibañes M. Pyogenic liver abscess: current status and predictive factors for recurrence and mortality of first episodes. *Hepato Pancreato Biliary Association Journal* (Oxford) 2016 ;18(12):1023-1030.
 10. Lai HC, Lin CC, Cheng KS, Kao JT, Chou JW, Peng CY, Lai SW, Chen PC, Sung FC. Increased incidence of gastrointestinal cancers among patients with pyogenic liver abscess: a population-based cohort study. *Gastroenterology* 2014 ;146 (1):129-137 e1.
 11. Qu K, Liu C, Wang ZX, Tian F, Wei JC, Tai MH, Zhou L, Meng FD, Wang RT, Xu XS. Pyogenic liver abscesses associated with nonmetastatic colorectal cancers: an increasing problem in Eastern Asia. *World Journal of Gastroenterology* 2012 ,21;18(23):2948-2955.
 12. Yang CC, Yen CH, Ho MW, Wang JH. Comparison of pyogenic liver abscess caused by non-Klebsiella pneumoniae and Klebsiella pneumoniae. *Journal of Microbiology Immunology Infection* 2004;37(3):176-184.
 13. K Park Text Book of Preventive & Social Medicine, 20th edition page 91
 14. Abbas MT, Khan FY, Muhsin SA, Al-Dehwe B, Abukumar M, Elzouki AN. Epidemiology, Clinical Features and Outcome of Liver Abscess: A single Reference Center Experience in Qatar. *Oman Medical Journal* 2014; 29(4):260-263.
 15. Kaplan GG, Gregson DB, Laupland KB. Population-based study of the epidemiology of and the risk factors for pyogenic liver abscess. *Clinical Gastroenterology & Hepatology* 2004;2(11):1032-1038.
 16. Vineet Jain, Smita Manjavkar, Prem Kapur, Durfishan, Divya Rajput, Tanveer Mir. Clinical and biochemical profile of liver abscess patients. *International Journal of Research in Medical Sciences* 2017; 5 (6):2596-2600.
 17. Ochsner A, DeBakey M, Murray S. Pyogenic abscess of the liver: II. An analysis of forty-seven cases with review of the literature. *American Journal of Surgery* 1938;40(1):292-319
 18. Sharma N, Sharma A, Varma S, Lal A, Singh V. Amoebic liver abscess in the medical emergency of a North Indian hospital. *BMC Research Notes* 2010; 3(1):21.
 19. Mukhopadhyay M, Saha AK, Sarkar A, Mukherjee S. Amoebic liver abscess: presentation and complications. *Indian Journal Surgery* 2010;72(1):37-41.
 20. Ghosh S, Sharma S, Gadpayle AK, Gupta HK, Mahajan RK, Sahoo R, et al. Clinical, Laboratory, and Management Profile in Patients of Liver Abscess from Northern India. *Journal of Tropical Medicine* 2014; 6:1423-1482.
 21. Pang TC, Fung T, Samra J, Hugh TJ, Smith RC. Pyogenic liver abscess: An audit of 10 years' experience. *World Journal of Gastroenterology* 2011;17: 1622- 1630.
 22. Heneghan HM, Healy NA, Martin ST, Ryan RS, Nolan N, Traynor O, et al. Modern management of pyogenic hepatic abscess: a case series and review of the literature. *BioMedical Central Research Notes* 2011; 4(1):80.
 23. Mohsen AH, Green ST, Read RC, McKendrick MW. Liver abscess in adults: ten years experience in a UK centre. *Quarterly Journal of Medicine* 2002; 95 (12):797-802.
 24. Islam N. The poor access to under land for housing. In urban land management in Bangladesh. Ministry of Land, Government of Bangladesh; 1992:131-140.
 25. Aikat BK, Bhusnurmath SR, Pal AK, Chhuttani PN, Datta DV. Amoebic liver abscess-a clinicopathological study. *Indian Journal of Medical Research* 1978; 67:381-391.
 26. Das AK, moniSaikia A, moyeeSaikia A, Dutta N. Clinico-epidemiological Profile of Patients with Liver Abscess: A Hospital Based Study. *Indian Journal Basic Applied Medical Research* 2015; 5(1):17-25.

Address for correspondence: Dr. Paharam Adhikari, Associate Professor, Department of Community Medicine, Govt. Medical College Datia, Madhya Pradesh, India.
Email: dradhikari2002@gmail,
Mobile: +91 6264968145.

How to cite this article: Ghanshyam Ahirwar, Sanjeev Kumar, Manohar Bhatia, Paharam Adhikari, Shubhanshu Gupta, Rajju Tiwari and Sarvesh Kumar Awasthy. An Epidemic Investigation of Abdominal Pain Related with Liver infection. *Walawalkar International Medical Journal* 2021; 8(2):22-27.
<http://www.wimjournal.com>.

Received date: 08/09/2021

Revised date: 24/11/2021

Accepted date: 25/11/2021