

Original Article

A Study on Risk Factor Assessment, Clinical Profile and Outcome Analysis of Liver Abscess Cases from A Tertiary Care Hospital, Kolkata

Dolanchampa Modak¹, Rupak Chatterjee²

Background : Liver abscess is the most common visceral abscess and contributes to a significant number of morbidity and mortality in tropical countries. India is second highest in incidence of liver abscess. The aim of this study is to describe patient's clinical profile, evaluation of contributing risk factors and treatment outcome of liver abscess from a tertiary care hospital of Kolkata.

Materials and Methods : A prospective observational study was carried out in Calcutta School of Tropical Medicine over a period of 1 year and 34 cases were recruited.

Results : The mean age of patient was 39.74±11.57 years with male pre-ponderance (85.3%). Fever followed by abdominal pain was most common presentations. 10 patients had Diabetes mellitus, 13 patients were chronic alcohol users and 5 were immune-compromised being HIV-1 seropositive. 2/3rd of the cases were amebic liver abscess and rest were of pyogenic. *Klebsiella pneumoniae* could be isolated in two cases. Right sided pleural effusion, sepsis and rupture of abscess were noted as complications.

Conclusion : Uncontrolled Diabetes mellitus, Chronic alcohol use and HIV infection are important risk factors for development of liver abscess.

[J Indian Med Assoc 2024; 122(6): 47-51]

Key words : Liver Abscess, Ultrasonography Abdomen, Diabetes Mellitus.

Liver abscess is a well prevalent condition in tropics characterised by collection of purulent inflammatory material in liver parenchyma which may be due to myriad infections including bacterial, parasitic, fungal or mixed¹. Liver abscess constitutes almost half of visceral abscesses and 13% of all intra-abdominal abscesses². Thus, it is a common cause of visceral abscess, with mortality ranging upto 12%³. The incidence of liver abscess is gradually increasing globally and around 2.30-17.59 per 100,000 per year⁴. Liver abscess is still a common infection in developing countries like India. Amebic liver abscess constitutes the majority of the cause, in contrast to developed countries, where, Pyogenic liver abscess is more common⁵. With the advent of radiological techniques like Ultrasonography and CT Scan of abdomen, diagnosis has become much easier. India, being the 2nd highest in incidence of liver abscess, prompt suspicion and early diagnosis with proper management is of utmost importance so, as to avoid mortality resulting from complication⁶.

Department of Tropical Medicine, Calcutta School of Tropical Medicine, Kolkata 700073

¹MD (Tropical Medicine), Associate Professor and Corresponding Author

²MD (Tropical Medicine), Senior Resident

Received on : 14/02/2023

Accepted on : 10/04/2023

Editor's Comment :

- In India amoebic liver abscess still remains the commonest cause of liver abscess, followed by pyogenic liver abscess.
- Un controlled diabetes mellitus and alcoholism are the highest risk factors associated with liver abscess.

In this study, we describe the clinical and laboratory parameters of liver abscess cases admitted in our hospital with their line of management and we also evaluated the underlying risk factors which predispose to development of liver abscess.

MATERIALS AND METHODS

This prospective observational study was carried out in Calcutta School of Tropical Medicine, Kolkata over a period of one year from June, 2020 to May, 2021. 34 patients admitted and diagnosed in indoor of Department of Tropical Medicine were included in this study with informed consent and after Ethical approval. Detailed history taking and physical examination were done in all cases. All the patients were subjected to Complete Blood Count (CBC), Liver Function Test (LFT), Urea, Creatinine, Fasting Blood Sugar (FBS), Prothrombin time (PT/INR), Urine and Stool examination and Ultrasonography (USG) whole abdomen. Contrast enhanced Computed Tomography (CECT) Abdomen was done in selected cases. Aspirated pus (Radiologically guided) was sent for

detailed microbiological examination including culture. The detailed data were recorded in Microsoft Excel and SPSS 28 Software was used for statistical analysis.

Ethics : Institutional ethical committee permission was taken. Anonymity of the patients was maintained in all cases.

RESULTS

A total of 34 patients of liver abscess admitted in our setup were included in our study. The mean age of the study subjects was 39.74±11.57 years. Majority of them were between 31 to 40 years of age (Fig 1). Out of 34 subjects, 29 were males and 5 females. The most common clinical presentation was fever, present in all cases (100%)(Table 1). The mean duration of fever was 17.41 ± 9.36 days. 5 patients had fever ≥30 days. Those having abdominal pain had pain more than 5 days of duration. Mean duration of jaundice was 8.4 days. One case presented with shock. Diarrhea history was present in only 6 cases (17.65%). 10 patients had Diabetes mellitus, 13 patients were chronic alcohol users and 5 were immune-compromised being HIV 1 seropositive (Fig 2).

20 patients out of 34 (58.8%) had at least one risk factor. 8 of them had ≥2 risk factors. Of the 10 diabetics with liver abscess, all had poor glycemic control with mean FBS being 220.9 mg/dl, 6 were on insulin therapy. The alcohol users with liver abscess had more than 10 years of alcohol consumption history and 5 out of the 13 alcohol users had APRI (AST to Platelet Ratio Index) more than 1.5, suggesting advanced liver fibrosis. The HIV seropositive patients developing liver abscess had unsuppressed HIV viral load, were poorly adherent to prescribed anti-retroviral therapy and their CD4 counts were less than 350/mm³. COVID-19 RTPCR was done in all the cases admitted from April, 2020 onwards and all tested negative. USG Whole Abdomen revealed single liver abscess in 17 cases (50%) and >1 in 17 cases. Of them, 2 subjects had 3 abscesses. Majority of the abscesses were of size between 5 to 10cm (Fig 3). Of the 17 solitary abscesses, it was right lobe abscess in 16 cases. (94.1%). Chest X-ray (PA view) revealed right sided pleural effusion in 3 cases. Complete Blood count of the study subjects showed mean hemoglobin to be 10.44g%. Mean total Leukocyte count was 12,292/mm³ with neutrophilic predominant, eosinophilia (>4%) was noted in 5 cases. Mean Platelet count was 1,92,821/mm³. ESR was raised in all 34 cases. CRP mean was 107.44±67.69 mg/dl. LDH mean was 302.79±179.53 U/L.

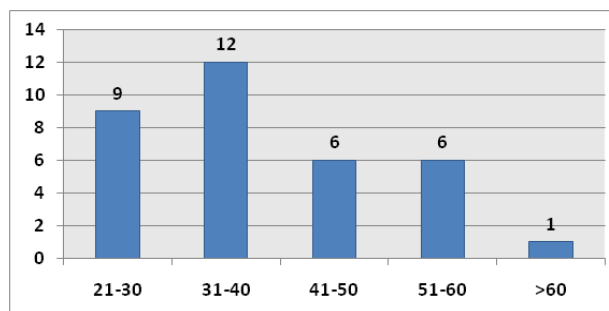


Fig 1 — Age wise distribution of study population (in years)

Clinical feature	Number of patients	%
Fever	34	100
Chill & rigor	5	14.7
Abdominal pain	30	88.2
Nausea	11	32.4
Vomiting	5	14.7
Shortness of breath	3	8.8
Jaundice	5	14.7
Shock	1	2.9

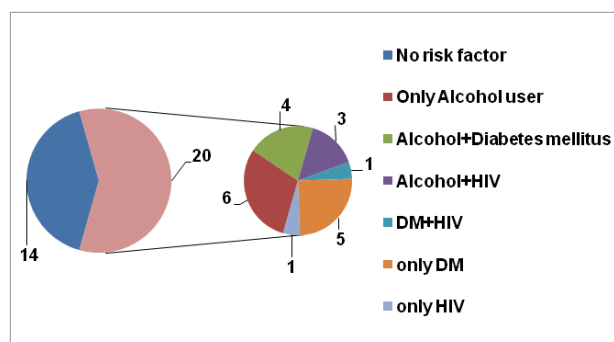


Fig 2 — Risk factor profile

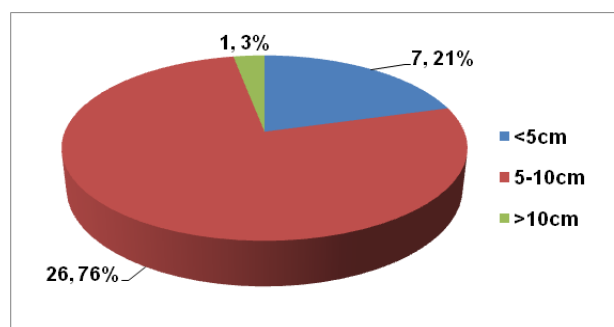


Fig 3 — Liver Abscess size

Microbiological examination with aspirated pus culture & sensitivity was done. Microscopic examination of freshly isolated pus from abscess could isolate Ameba- *Entameba histolytica* in 5 cases by demonstration of motile trophozoites in wet mount preparation. *Klebsiella pneumonia* was found in 2

cases. Due to lack of anaerobic culture methods in our institute, we could not detect any such organism in our cases. All cases of documented amebic liver abscesses were solitary. Typical Anchovy- sauce appearance of the pus was noted in 21 cases (61.76%). Mean LFT parameters were – Total bilirubin : 1.91 mg/dl, Conjugated bilirubin : 1.08 mg/dl, Albumin : 3.18g/dl, Globulin : 3.45g/dl, SGOT : 65.21U/L, SGPT : 57.03U/L, Alkaline phosphatase : 283.06U/L, INR : 13.97 secs and INR to be 1.45 (Table 2). Mean CRP was 107.44mg/dl and mean LDH 302.79 IU/L. Albumin: Globulin ratio was significantly altered in 7 cases. Hyperbilirubinemia noted was predominantly conjugated hyperbilirubinemia in 9 cases. (82%). SGOT was significantly more than SGPT in 14 cases including alcohol users and in 15 cases, SGPT was higher than SGOT.

The empiric antibiotics used for liver abscess treatment were metronidazole and ceftriaxone to start with in 16 cases and piperacillin/tazobactam plus metronidazole in 10 cases in injectable forms. In 14 cases, Injection meropenem had to be used as upgradation/escalated therapy and in 8 cases Injection meropenem was used as first line drug (Fig 4). Piperacillin/Tazobactam and meropenem were used as 1st line therapy in cases where there was more than one liver abscess and patients had features of sepsis or were uncontrolled diabetic or immunocompromised or had abscess rupture with laboratory parameter of Total Leukocyte Count and CRP being very high. Excepting for these mentioned cases, in all other cases Injection Ceftriaxone was initially given as anti-bacterial agent combined with injectable metronidazole following our institution's antimicrobial therapy protocol guideline. Injectable metronidazole was stopped after 7 days of treatment initiation and intravenous antibiotics were continued for 48 hours after patient became afebrile and reduction in leukocytosis. The minimum duration of antibiotics was 10 days and maximum 28 days. Mean duration of hospital stay was 13.5 days, those with multiple abscesses and rupture needed prolong treatment with maximum duration of 4 weeks. We noted pleural effusion, sepsis and rupture of abscess as the complications. There was pleural effusion in 3(8.82%) cases, rupture of abscess in 3 cases (8.82%) and sepsis in 4 (11.76%) cases. Percutaneous catheter drainage was done in 3 cases and pigtail catheter drainage was given in 26 cases.

Follow-up of all the cases were done at 2 weeks, 1month, 3 months, 6 months and at the end of one year of diagnosis and Ultrasound scan of abdomen was repeated at 1month, 3, 6 months and at 1 year. In 30 cases out of 34, there was reduction in size of the

Parameter	No of cases	% of total cases
Serum bilirubin >1.3mg/dl	11	32.4
SGOT > 40 U/L	17	50
SGPT > 40U/L	19	55.9
ALP > 100U/L	34	100
Serum albumin <3.5g/dl	20	58.8
INR > 1	34	100

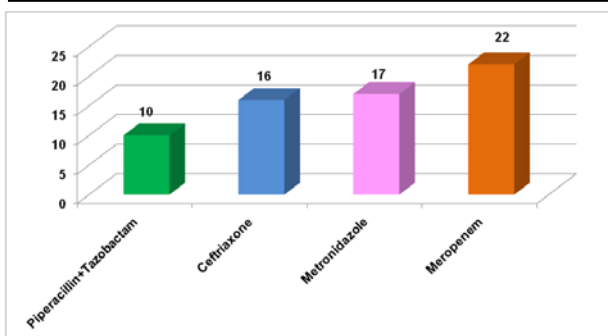


Fig 4 — Antibiotics used for treatment (no of cases)

abscess on repeat scan after one month. All of the cases except those 3 with rupture, had >50% reduction size at end of 3months. In 27 cases out of the 31 (77.4%), there was resolution of abscess at 6 months follow-up. But in 4 cases, there was residual changes (though reduced by >75% in size), detected in USG abdomen till one year. All of the 7 cases had more than 1 out of the 3 risk factors- namely, Diabetes Mellitus, alcohol abuse or HIV seropositivity. Prognosis was excellent; all patients could be managed successfully with medical treatment and combined surgical drainage without any mortality.

DISCUSSION

Liver abscess is classically into two broad groups based on etiology- amebic and pyogenic. It is one of the most common infection of liver, following viral hepatitis, especially in tropical countries like India.

In our study, 85.3% of study population were males. This is similar to the study by Choudhary V, *et al*; Jain V, *et al* and Kiranmayee N, *et al* where male preponderance ($\geq 80\%$) were noted⁷⁻⁹. Most of the patients were between 31 to 40 years of age with mean age of 39.74 ± 11.57 years. Mean age of study population was 46.95 years, 41.8 years and 50.1 years respectively in studies by Choudhary, *et al*; Jain, *et al* and Kiranmayee, *et al* respectively⁷⁻⁹.

The study by Choudhury, *et al* reported abdominal pain, fever, jaundice to be present in 98%, 94% and 25% respectively⁶. Jain, *et al* reported fever in 94% cases and pain abdomen and jaundice in 96% and 18% cases overall⁸. We also noted similar findings in our study with fever present in all (100%) cases and

abdominal pain and jaundice seen in around 88% and 15% cases respectively. Thus, fever and abdominal pain are the two most common presentations.

In our study, we found alcohol consumption, Diabetes mellitus (uncontrolled) and HIV infection to be associated with increased risk of developing liver abscess. Alcohol increases risk by impairing the activity of Kupffer cells¹⁰. Uncontrolled Diabetes predisposes to liver abscess by impairing leukocyte adherence, chemotaxis, phagocytosis and overall reduction in anti-microbial activity¹¹. HIV seropositive patients, particularly those who have high viral loads or low CD4 cell counts are susceptible to infections including liver abscess because of immunosuppression¹². A study in Taiwan on association between HIV and amebic liver abscess concluded that HIV seropositives who are homosexuals are at more risk for amebic liver abscess because of oro-anal transmission, which attributed to 86% of cases in their study¹³. Among 5 of our HIV positive patients 2 were MSM, all had high HIV viral load, poor anti-retroviral drug adherence history and two of them were diagnosed as 1st line antiretroviral treatment failure. Most of the liver abscesses in HIV are pyogenic and common causative organisms are *Klebsiella*, *Escherichia coli*, *Pseudomonas aeruginosa* and *Staphylococcus*¹².

Recent literature revealed that liver abscess in HIV positive patients, >50% cases are associated biliary tract infection, other causes are portal vein and hepatic artery seeding, direct extension, penetrating liver injury, and cryptogenic causes and commonest organisms are bacterial¹⁴.

Most studies demonstrated that right lobe is most commonly involved in liver abscess, similar finding was also noted in our study⁷⁻⁹.

Amebic liver abscess constitutes 2/3rd of all cases of liver abscess⁶⁻⁸. In our study, around 60% cases were of amebic liver abscess, but demonstration of ameba could be done in only 5 cases. Among the causes of pyogenic liver abscess, gram negative bacilli are mostly responsible with *E coli* and *Klebsiella pneumoniae* being most frequently isolated⁷⁻⁹.

Our Complete blood count and LFT parameters were similar to most studies with leukocytosis and predominant polymorphs. We noted eosinophilia in 5 (14.7%) cases⁷⁻⁹.

Antibiotics started empirically to treat case of liver abscess should be such so as to cover *Entameba histolytica* and Gram Negative bacilli-Enterobacteriaceae, anaerobes. Cephalosporins combined with metronidazole or beta-lactam and beta lactamase inhibitor with metronidazole are commonly advocated

regimens¹⁵. In our cases, we used metronidazole and ceftriaxone to start with in 16 cases and Piperacillin/tazobactam plus metronidazole in 10 cases in injectable forms. In 14 cases, Injection meropenem had to be used as upgradation/escalated therapy and in 8 cases, Injection meropenem was used as first line drug.

If untreated, hepatic abscess can rupture, cause peritonitis and shock. Four to six weeks of antibiotic therapy postdrainage can prevent almost any complications^{15,16}. There was rupture of abscess in 3 cases in our study and all of them could be managed successfully with 4 weeks of antibiotic therapy.

Pigtail drainage was given in 26 cases in our study. Pigtail drainage is more effective than percutaneous needle aspiration as reported in literature^{17,18}.

According to Sayek I, *et al*, antimicrobial therapy is needed for 7 to 10 days in uncomplicated cases. Therapy may be prolonged in cases with complications including rupture. Abscesses of less than 5cm size respond to antimicrobial treatment alone; in sizes exceeding 5cm, surgical intervention is needed for source control¹⁹.

In the study by Sudhamshu K C, *et al*; 116 patients of liver abscess were followed up by USG. USG was repeated after 2weeks, 1month, 3months, 6months and 12 months of treatment. Thereafter, it was repeated after 6months. They noted that, there was sonological resolution in majority of the cases after 2-18weeks of treatment. In those cases with delayed resolution, they observed presence of Diabetes Mellitus or Alcoholism as risk factors²⁰.

In case of pyogenic liver abscess, empirical treatment should be such so as to cover the likely pathogens. It is advisable to start broad-spectrum antibiotics immediately after collection of microbiological specimen- abscess pus and blood culture²¹. As there is increasing resistance rates against Fluoroquinolones in cases of *E coli*, *Klebsiella pneumoniae* and other enterobacteriaceae, 3rd generation cephalosporins- ceftriaxone and Piperacillin/Tazobactam have taken a pivotal role in initial therapy^{20,21}. As liver abscess may be due to pyogenic or amebic cause, combining either a 3rd generation cephalosporin or piperacillin/tazobactam with metronidazole is recommended as initial antibiotic regimen²².

Carbapenems are the drug of choice for Extended Spectrum Beta-lactamases (ESBL) producing Gram negative bacilli. Studies have found that carbapenem use is independently associated with lower mortality than other antibiotics²¹.

In our study mean duration of hospital stay was 13.5 days, multiple liver abscesses and rupture one required more than 10 days antibiotic treatment with a maximum period of 28 days. Abbas, *et al* in their study documented the mean duration of hospital stay for those with pyogenic liver abscesses was 13.6 days and amebic liver abscesses had a mean hospital stay of approximately 7.7 days²³.

The determining factors for total duration of treatment should be clinical response – resolution of fever, laboratory response- resolution of leukocytosis and thirdly, radiological response in form of repeated USG to see size of the abscess²¹.

In our cases, we used resolution of fever, decrease in total Leukocyte count and reduction in discharge through pigtail catheter drainage (in cases where given), as markers to determine course and duration and form of therapy.

A multivariate analysis revealed that underlying diabetes mellitus, hypoalbuminemia, high baseline high-sensitivity C-reactive Protein (hs-CRP) and procalcitonin levels and large maximal abscess diameter were independent factors associated with prolonged hospital stay. Regarding in-hospital mortality, acute kidney injury at admission and maximal diameter of the abscess were independent factors associated with in-hospital mortality²⁴.

There was no mortality in our study. USG abdomen is a simple, inexpensive tool to cliché the diagnosis of liver abscess. Prompt clinical suspicion coupled with USG and starting combination antimicrobial therapy can lead to decreased mortality and complications.

CONCLUSION

In the eastern part of India liver abscess is quite common in middle aged adults, major risk factors were uncontrolled diabetes mellitus, alcoholism and HIV infection. Commonest presentation were fever of more than ten days and abdominal pain. Prolonged antibiotic therapy was required for complicated abscess, common complications were pleural effusion, rupture of the abscess and sepsis.

ACKNOWLEDGEMENT

We must acknowledge my patients for giving their consent and thankful to all hospital staffs who were involved in active patient care for this study.

REFERENCES

- Mischnik A, Kern WV, Thimme R — Pyogenic Liver abscess: Changes of organisms and consequences for diagnosis and therapy. *Dtsch Med Wochenschr* 2017; **142(14)**: 1067-74.
- Altmeier WA, Culbertson WR, Fullen WD — Intraabdominal abscesses. *Am J Surg* 1973; **125**: 70-9.
- Mohsen AH, Green ST, Read RC — Liver Abscess in adults: ten years experience in a UK centre. *QJM* 2002; **95**: 797-802.
- Tsai F, Huang Y, Chang L — Pyogenic Liver Abscess as Endemic Disease, Taiwan. *Emerging Infectious Diseases* 2008; **14(10)**: 1592-600.
- Oschner A, Debaquey M, Murray S — Pyogenic abscess of the liver. An Analysis of 47 cases with review of the literature. *Am J Surg* 1938; **40(1)**: 292-319.
- Channanna C, Rehman FU, Choudhuri B — A clinical study, diagnosis and management of liver abscess at VIMS, Bellary. *J Evidence Based Med Health Care* 2014; **1**: 668-85.
- Choudhury V, Choudhury A — Clinico-pathological profile of liver abscess: a prospective study of 100 cases. *Int Surg J* 2016; **3**: 266-70.
- Jain V, Manjavkar S, Kapur P — Clinical and biochemical profile of liver abscess patients. *Int J Res Med Sci* 2017; **5**: 2596-600.
- Kiranmayee N, Subbalaxmi MVS, Umbala P — Study of clinico-etiological profile and management of liver abscess in a tertiary care centre. *J Clin Sci Res* 2022; **11**: 7-12.
- Makkar RP, Sachdev GK, Malhotra V — Alcohol consumption, hepatic iron load and the risk of amoebic liver abscess: A case control study. *Intern Med* 2003; **42**: 644-9.
- Lin YT, Wang FD, Wu PF — *Klebsiella pneumoniae* liver abscess in diabetic patients : Association of glycemic control with clinical characteristics. *BMC Infect Dis* 2013; **13**: 56
- Wiwanitkit V — Causative agents of liver abscess in HIV-seropositive patients : a 10year case series in Thai hospitalized patients. *Trop Doct* 2005; **35(2)**: 115-7.
- Hsu MS, Hsieh SM, Chen MY — Association between amebic liver abscess and Human Immunodeficiency Virus infection in Taiwanese subjects. *BMC Infect Dis* 2008; **8**: 48.
- Zhang W, Yu H, Luo N, Hu Z — Clinical Characteristics and Treatment Outcomes in Human Immunodeficiency Virus (HIV)-Infected Patients with Liver Abscess: A Retrospective Study of 53 Patients. *Med Sci Monit* 2020; **26**: e923761.
- Akhondi H, Sabih DE — Liver Abscess. 2022 Jul 4. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2022 Jan-. PMID: 30855818.
- Rahimian J, Wilson T, Oram V — Pyogenic liver abscess: recent trends in etiology and mortality. *Clin Infect Dis* 2004; **39(11)**: 1654-9.
- Rajak CL, Gupta S, Jain S — Percutaneous Treatment of liver abscess. Needle Aspiration versus Catheter drainage. *Am Journal Roent* 1998; **170**: 1035-9.
- Wong KP — Percutaneous drainage of pyogenic liver abscess. *World Journ Surgery* 1990; **14**: 492-7.
- Sayek I, Onat D — Pyogenic and amebic liver abscess. Surgical Treatment : Evidence based and Problem oriented. Munich: Zuckschwerdt; 2001.
- Sudhamshu KC, Sharma D — Long-term follow-up of pyogenic liver abscess by ultrasound. *Eur J Radiol* 2010; **74(1)**: 195-8. DOI: 10.1016/j.ejrad.2009.01.017.
- Siu LK, Yeh KM, Lin JC — *Klebsiella pneumoniae* liver abscess: a new invasive syndrome. *Lancet Infect Dis* 2012; **12**: 881-7.
- Lubbert C, Weigand J, Karlas T — Therapy of Liver Abscesses. *Viszeralmedizin* 2014; **30(5)**: 334-41.
- Abbas MT, Khan FY, Muhsin SA, Al-Dehwe B, Abukamar M, Elzouki AN — Epidemiology, Clinical Features and Outcome of Liver Abscess: A single Reference Center Experience in Qatar. *Oman Med J* 2014; **29(4)**: 260-3.
- Lee CH, Jo HG, Cho EY — Maximal diameter of liver abscess independently predicts prolonged hospitalization and poor prognosis in patients with pyogenic liver abscess. *BMC Infect Dis* 2021; **21**: 171.