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Original Research Article

Role of Diffusion-Weighted MRI in Characterization of Liver Lesions

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Abstract:

Background: To appropriately treat a focal liver lesion (FLL) and maximize patient outcomes, its nature must be accurately determined. In many situations, it is difficult to differentiate between benign and malignant lesions using conventional magnetic resonance imaging (MRI) technique, which gives excellent anatomical information. Additional functional information can be obtained from diffusion-weighted magnetic resonance imaging (DW-MRI), which assesses water molecule diffusion in tissues, and improves lesion characterization.

Aim: To assess the potential of diffusion-weighted magnetic resonance imaging (DW-MRI) for characterization and differential diagnosis of focal liver lesions.

Methodology: The present study is prospective, observational, cross-sectional hospital-based study and was conducted in the Department of Radiodiagnosis, Indira Gandhi Institute of Medical Sciences, Patna, Bihar, India for one year. In all, 90 patients with focal liver lesions underwent conventional MRI and DWI. Qualitative diffusion characteristics and quantitative apparent diffusion coefficient (ADC) values were evaluated and compared with the final diagnosis reached by histopathology, clinical, imaging and/or follow-up.

Results: Diffusion-weighted MRI effectively differentiated benign from malignant focal liver lesions by demonstrating distinct diffusion characteristics and significant differences in ADC values. Malignant lesions showed greater diffusion restriction and lower ADC values than benign lesions. The addition of DW-MRI to conventional MRI improved lesion conspicuity, diagnostic confidence, and overall diagnostic accuracy, demonstrating high sensitivity and specificity for differentiating focal liver lesions.

Conclusion: DW MRI was able to differentiate benign from malignant focal liver lesions, with the ability to show different diffusion properties in the lesion and a significant difference in ADC values. The diffusion restriction was larger, and the ADC values were lower for malignant lesions than for benign lesions. The addition of DW-MRI to conventional MRI led to improved lesion conspicuity, diagnostic confidence, and overall diagnostic accuracy with high sensitivity and specificity for discriminating focal liver lesions.

Keywords: Diffusion-weighted magnetic resonance imaging, diffusion-weighted imaging, apparent diffusion coefficient, focal liver lesions, liver MRI, hepatocellular carcinoma, hepatic metastasis, benign liver lesions, malignant liver lesions.

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Introduction

Focal lesions, whether benign or malignant, are common in the liver because of its metabolism and central blood supply. Focal liver lesions (FLLs) refer to a broad range of pathological processes, including benign forms like hepatic cysts, hemangiomas, focal nodular hyperplasia and hepatocellular adenoma, and malignant forms such as hepatocellular carcinoma (HCC), cholangiocarcinoma, and metastatic tumors. Diagnosing these lesions accurately is critical since treatment approaches, prognosis and clinical results vary significantly between benign and malignant disease. Early and accurate discrimination of focal liver lesions allows early intervention, avoids unnecessary invasive procedures and enhances patients' survival rate. Although great strides have been made in the development of diagnostic imaging techniques, the differential diagnosis of benign from malignant hepatic lesions is still a daunting challenge, especially when lesions have overlapping imaging features or when the patient has chronic liver disease or cirrhosis [1,2].

MRI has become the modality of choice for imaging focal liver lesions due to its unique soft-tissue contrast, multiplanar ability, and lack of ionizing radiation to acquire both anatomical and functional information. Lesion detection and characterization have improved greatly with conventional MRI sequences, such as T1-weighted, T2-weighted, dynamic contrast-enhanced and hepatobiliary phase imaging. However, some lesions have similar morphological and contrast features and can be difficult to diagnose definitively on the basis of morphology and contrast enhancement alone. Therefore, functional MRI techniques have attracted more and more interest to further enhance the accuracy of diagnosis in hepatic imaging [3].

An advanced functional MRI technique, diffusion-weighted magnetic resonance imaging (DWI) assesses Brownian motion, or the random microscopic movement of water molecules in biological tissues. The level of water diffusion depends on tissue cellularity, extracellular space, integrity of the membranes and the organization of the tissue's microstructures. Increased cell density and decreased extracellular space in highly cellular malignant tumors decreases the water diffusion whereas most benign lesions show the relatively unrestricted diffusion of water. The diffusion characteristics are numerically measured by the apparent diffusion coefficient (ADC) which is a quantitative parameter that is used to quantify tissue diffusivity in an objective manner. Therefore, DWI and ADC mapping have been found to be useful biomarkers for tissue characterization in several organ systems [4,5].

In the past, diffusion weighting was mainly applied to the field of neuroimaging for the early detection of acute cerebral ischemia since it has shown superior sensitivity to restricted diffusion immediately after ischemic injury. Further technological developments such as rapid echo planar imaging, respiratory triggering, parallel imaging and better gradient performance have significantly decreased motion artifacts and image distortion and increased the signal to noise ratio. With the development of these, DWI is now being regularly used for imaging the liver and other abdominal organs, although respiratory motion and cardiac pulsation present some difficulties in abdominal imaging [6,7].

The role of diffusion weighted MRI in hepatic imaging has been shown to be very useful for the detection, characterization and follow-up of focal liver lesions. DWI offers high lesions to liver contrast and will allow visualization of lesions which may not be apparent on conventional MRI sequences. Moreover, ADC measurements have been found to discriminate between benign and malignant liver lesions, with malignant lesions having much lower ADC values because of their restricted diffusion compared to benign lesions, such as cysts and hemangiomas. Many studies have shown that the use of DWI with standard MRI sequences increases diagnostic certainty and the diagnostic accuracy in challenging liver lesions [8-10] that might produce diagnostic uncertainty with conventional MRI sequences.

Advanced liver imaging protocols have also been incorporated into the practice of DWI, enhancing its capabilities. Diffusion-weighted imaging is a technique which provides the additional benefit of functional assessment of the liver and is more sensitive than hepatocyte-specific contrast agents or superparamagnetic iron oxide (SPIO) enhanced MRI for increasing contrast between focal lesions and normal liver parenchyma without needing to administer intravenous contrast agents. This is especially useful for patients with renal insufficiency, contrast allergies, and those who cannot tolerate gadolinium-based contrast agents. Furthermore, DWI is used for whole-liver screening for small lesions that might not be in sight otherwise and is important for assessment of response to locoregional or systemic therapies (chemotherapy and surgery) as ADC changes precede morphological changes [11].

Although these benefits are present, there are still diagnostic difficulties because some benign and malignant lesions may overlap for ADC values, imaging protocols may differ, and the strength of the magnetic field may vary. Hence, DWI should not be used as a stand-alone method of diagnosis but in conjunction with other MRI data and clinical information. By continuous developments of MRI technology, standardized acquisition protocols and quantitative imaging techniques, the diagnostic performance and reproducibility of DWI in liver imaging is expected to be further improved [12,13].

The clinical utility of diffusion-weighted MRI (DW-MRI) in the common clinical environment is gaining importance in view of the increasing burden of hepatic diseases and the rising demand for accurate non-invasive diagnostic techniques. A detailed MRI examination, which includes diffusion weighted imaging, can enhance the characterization and differential diagnosis of focal liver lesions and aid in clinical decision-making and patient management at the Department of Radiodiagnosis, Indira Gandhi Institute of Medical Sciences (IGIMS), Patna, Bihar, India. Thus, the aim of the present study was to assess the role of DW-MRI in the characterization and differential diagnosis of focal liver lesions with a view of evaluating its diagnostic performance in distinguishing benign and malignant hepatic lesions.

Methodology

Study Design: This was a prospective, observational, cross-sectional, hospital-based study that aimed to assess the contribution of diffusion-weighted magnetic resonance imaging (DW-MRI) to the characterization and differential diagnosis of focal liver lesions (FLLs). The purpose of the study was to evaluate the value of qualitative (diffusion-weighted imaging morphology) and quantitative (apparent diffusion coefficient, ADC) MRI parameters in the distinction of benign from malignant focal liver lesions in comparison with histopathology, radiological follow-up, or clinical correlation.

Study Area: The study was carried out in the Department of Radiodiagnosis at Indira Gandhi Institute of Medical Sciences (IGIMS), Patna, Bihar, India.

Study Duration: The study was carried out over a period of one year from April 2025 to March 2026.

Sample Size: During the study period, 90 patients (N = 90) with focal liver lesions, who met the inclusion/exclusion criteria, were consecutively enrolled.

Sample Population: The study population included adult patients with one or more focal liver lesions identified on ultrasonography or CT or on prior MRI scans who were referred for additional MRI characterization using diffusion-weighted imaging (DWI). Patients were included both men and women regardless of size of the lesion, if adequate MRI evaluation was possible.

Data Collection: Demographic information, clinical history, presenting complaints, laboratory investigations and previous imaging studies were collected with informed written consent, and entered into a pre-designed data collection sheet. All patients enrolled in the study were scanned with a standardized MRI protocol of routine sequences and diffusion-weighted imaging of the liver.

When histopathological diagnosis of a liver lesion was available, the final diagnosis for each lesion was made using this method. Biopsy was not necessary in 29 cases, and a diagnosis was made using imaging features, laboratory tests such as serum alpha-fetoprotein (AFP) (when available) and clinical history and imaging findings. The lesions were classified as benign or malignant for statistical analysis.

Inclusion Criteria

Patients fulfilling the following criteria were included in the study:

- Adult patients (≥18 years) with one or more focal liver lesions detected on ultrasonography or CT.
- Patients referred to MRI evaluation including diffusion-weighted imaging.
- Patients are willing to participate and provide written informed consent.
- Patients with adequate clinical, laboratory, imaging, or histopathological information to establish the final diagnosis.

Exclusion Criteria

Patients were excluded if they met any of the following criteria:

- Diffuse liver disease without a discrete focal lesion.
- Contraindications to MRI, including cardiac pacemakers, cochlear implants, ferromagnetic intracranial clips, or metallic foreign bodies incompatible with MRI.
- Severe claustrophobia prevents MRI examinations.
- Patients with poor-quality or motion-degraded MRI images are unsuitable for interpretation.
- Pregnant women unless MRI was clinically justified.
- Patients with incomplete clinical or imaging data or who declined participation.

Procedure: MRI scans were conducted on a 1.5 or 3 Tesla MRI scanner with a phased-array body coil, following the institutional liver imaging protocol. If possible, the patients were asked to fast for 4–6 hours prior to the examination.

MRI consisted of axial and coronal T1-weight images, T2-weight images, fat-suppressed T2-weight images, diffusion-weighted imaging (DWI) and dynamic contrast-enhanced imaging (DCE) when clinically appropriate. Diffusion-weighted imaging was obtained with single-shot echo-planar imaging (SS-EPI) with respiratory-triggered or free breathing acquisition with multiple b-values (usually b = 0, 500, and 800–1000s/mm²).

The MRI workstation automatically generated apparent diffusion coefficient (ADC) maps. Regions of interest (ROIs) were strategically positioned within the solid part of each lesion but excluded areas of necrosis, hemorrhage, calcification and imaging artifacts. The largest or most representative lesion was chosen for quantitative analysis in patients with multiple lesions.

The number, size, anatomical location, signal characteristics of the lesions on conventional MRI sequences, diffusion restriction, lesion conspicuity on DWI and quantitative ADC values were evaluated for each lesion. The final diagnosis was then classified as a benign or malignant lesion. Diffusion weighted MRI (DW-MRI) and ADC values were examined to confirm the diagnostic value of DW-MRI and were also evaluated in comparison with conventional MRI for discriminating against focal liver lesions.

Statistical Analysis: The data collected were entered into Microsoft Excel and analyzed by the use of the Statistical Package for the Social Sciences version 26.0 (IBM Corp., Armonk, NY, USA).

Continuous variables like age, size of lesions, ADC were represented as mean ± standard deviation (SD) and categorical variables as frequencies and percentages.

Mean ADC values were compared between benign and malignant tumors by performing the Independent Student's t-test. Where appropriate, categorical variables were compared using the Chi-square test or Fisher's exact test. The diagnostic performance of diffusion-weighted MRI was assessed by calculating the sensitivity, the specificity, the positive predictive value (PPV) and the negative predictive value (NPV) and the diagnostic accuracy (DAV) and the receiver operating characteristic curve (ROC curve) for selecting optimal ADC cut-off value in differentiating the benign from the malignant focal liver lesions. A p-value of < 0.05 was deemed to be statistically significant".

Result

Table 1 shows the demography of the patient population of this study with 90 patients who had foci in the liver. The mean age was 50.4 ± 13.6 years, with the most frequent age group being 51-60 years (26.7%) followed by >60 years (20.0%) and 41-50 years (22.2%). The patient population aged 18-30 years represented 13.3% of the study population while the 31-40 years age group constituted 17.8% of the study population. The ratio of male to female patients was slightly in favor of the males (52 male, 38 female).

Table 1: Demographic Characteristics of the Study Population (N = 90)

Variable	Frequency (n)	Percentage (%)
Age Group (years)		
18–30	12	13.3
31–40	16	17.8
41–50	20	22.2
51–60	24	26.7
>60	18	20
Gender		
Male	52	57.8
Female	38	42.2
Mean age: 50.4 ± 13.6 years		

Summary of clinical presentation and baseline characteristics of the enrolled patients are presented in Table 2. The most frequent presenting symptom was right upper abdominal pain (52 patients, 57.8%) followed by weight loss (29 patients, 32.2%). Focal liver lesions were incidentally discovered during imaging for other diseases in 24 patients (26.7%), and chronic liver disease or cirrhosis in 21 patients (23.3%). Twenty percent (20.0%) and 17.8% of patients had reported fever and jaundice, respectively. In 17 patients (18.9%) the serum alpha-fetoprotein (AFP) level was elevated, and this was predominantly in patients who were later found to have malignant hepatic lesions.

Table 2: Clinical Presentation and Baseline Characteristics (N = 90)

Variable	Frequency (n)	Percentage (%)
Right upper abdominal pain	52	57.8
Weight loss	29	32.2
Fever	18	20
Jaundice	16	17.8
Incidental detection	24	26.7
Elevated AFP*	17	18.9
Chronic liver disease/cirrhosis	21	23.3
*AFP = Alpha-fetoprotein		

The final diagnostic distribution of focal liver lesions in study subjects is shown in table 3. There were 45 benign lesions (50.0%) and 45 malignant lesions (50.0%). Hepatic hemangioma (20.0%) was the most commonly diagnosed benign lesion, followed by simple hepatic cysts (11.1%), liver abscesses (7.8%), focal nodular hyperplasia (6.7%) and hepatic adenoma (4.4%). The most common diagnosis among all malignant lesions was hepatocellular carcinoma (23.3%), followed by hepatic metastases (20.0%) and cholangiocarcinoma (6.7%).

Table 3: Distribution of Focal Liver Lesions According to Final Diagnosis (N = 90)		
Lesion Type	**Frequency (n)**	**Percentage (%)**
Benign lesions		
Hemangioma	18	20
Simple hepatic cyst	10	11.1
Focal nodular hyperplasia (FNH)	6	6.7
Hepatic adenoma	4	4.4
Liver abscess	7	7.8
Total benign	**45**	**50**
Malignant lesions		
Hepatocellular carcinoma (HCC)	21	23.3
Metastases	18	20
Cholangiocarcinoma	6	6.7
Total malignant	**45**	**50**

The conventional MR findings of benign and malignant focal liver lesions are compared in Table 4. The hypointense area was seen in 75.6% of benign lesions compared with 93.3% of malignant lesions and the difference was statistically significant ($p = 0.021$). There was no significant difference between the number of benign lesions (84.4%) and malignant lesions (86.7%) that showed hyperintensity on T2 weighted MRI. Malignant lesions were significantly more likely to have irregular lesion margins than benign lesions (77.8% vs. 17.8% respectively, $p < 0.001$). Similarly, there was a highly significant association ($p < 0.001$) between contrast enhancement patterns and malignancy, with 86.7% of malignant lesions showing enhancement patterns suggestive of malignancy, compared with 13.3% of benign lesions.

Table 4: Conventional MRI Characteristics of Focal Liver Lesions (N = 90)			
MRI Findings	**Benign (n=45)**	**Malignant (n=45)**	**p-value**
T1 hypointense	34 (75.6%)	42 (93.3%)	0.021
T2 hyperintense	38 (84.4%)	39 (86.7%)	0.754
Irregular lesion margins	8 (17.8%)	35 (77.8%)	<0.001
Contrast enhancement pattern suggestive of malignancy	6 (13.3%)	39 (86.7%)	<0.001

Table 5 shows the characteristics of DW MR images of the liver of non-cancerous and cancerous focal lesions. Diffusion restriction was found in 42/45 malignant lesions (93.3%) and 9/45 benign lesions (20.0%) ($p < 0.001$). Lack of diffusion restrictions, however, was seen mainly in benign lesions (80.0%) and few in malignant lesions (6.7%). Furthermore, conspicuity of lesions on DWI was significantly higher in malignant lesions compared with benign lesions (95.6% vs 46.7%, $p < 0.001$), suggesting that DWI was more sensitive to detect lesions, especially malignant hepatic lesions.

Table 5: Diffusion-Weighted MRI Findings in Benign and Malignant Lesions (N = 90)			
DWI Finding	**Benign (n=45)**	**Malignant (n=45)**	**p-value**
Diffusion restriction present	9 (20.0%)	42 (93.3%)	<0.001
No diffusion restriction	36 (80.0%)	3 (6.7%)	
Lesion conspicuity improved on DWI	21 (46.7%)	43 (95.6%)	<0.001

Table 6 shows the apparent diffusion coefficient (ADC) values of benign and malignant focal liver lesions, quantitatively. Benign lesions demonstrated a significantly higher mean ADC value ($1.710 \pm 0.290 \times 10^{-3}$ mm²/s) compared with malignant lesions ($0.940 \pm 0.190 \times 10^{-3}$ mm²/s). A statistically significant difference between both groups ($p < 0.001$) was obtained, suggesting that water molecule diffusion is more restricted in malignant lesions than in benign lesions. These results indicate that quantitative ADC measurements are useful for distinguishing between benign and malignant focal liver lesions.

Table 6: Comparison of ADC Values Between Benign and Malignant Lesions			
Lesion Category	**Mean ADC ($\times 10^{-3}$ mm²/s)**	**SD**	**p-value**
Benign lesions	**1.71**	**0.29**	
Malignant lesions	**0.94**	**0.19**	**<0.001**

Table 7 shows the diagnostic accuracy of diffusion-weighted MRI for the differentiation of benign from malignant focal liver lesions. The sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV) were 93.3%, 80.0%, 82.4% and 92.3% respectively, whilst the overall diagnostic accuracy was 86.7% according to diffusion-weight MRI. Receiver operating characteristic (ROC) curve analysis determined an optimal ADC cutoff value of 1.24×10^{-3} mm²/s with an area under the curve (AUC) value of 0.931 and the overall diagnostic performance was statistically significant ($p < 0.001$). The results suggest that DW MRI and quantitative ADC analysis is highly accurate in the characterization and differential diagnosis of focal liver lesions.

Table 7: Diagnostic Performance of Diffusion-Weighted MRI

Parameter	Value (%)
Sensitivity	**93.3**
Specificity	**80**
Positive Predictive Value (PPV)	**82.4**
Negative Predictive Value (NPV)	**92.3**
Diagnostic Accuracy	**86.7**
Optimal ADC cut-off ($\times 10^{-3}$ mm²/s)	**1.24**
Area under ROC Curve (AUC)	**0.931**
p-value	**<0.001**

Discussion

The current study used diffusion-weighted magnetic resonance imaging (DW-MRI) in the characterization and differential diagnosis of focal liver lesions (FLLs) in 90 patients. The mean age was 50.4 ± 13.6 years, with the age group of 51-60 years having the highest number of patients (26.7%) followed by 41-50 years (22.2%). There was also a slight male predominance (57.8%). These results are similar to those reported by Taouli et al. [3] who reported that liver lesions are more common in older people and middle-aged people, and that males were more likely to have liver lesions, especially malignant liver lesions like HCC and metastatic liver tumors. The age distribution observed in the present study can be explained by the fact that chronic liver disease, viral hepatitis and hepatic malignancy are more common with ageing".

Concerning clinical presentation, right upper abdominal pain (57.8%) was the most frequent symptom followed by weight loss (32.2%) and 26.7% of lesions were found as incidental findings on imaging for unrelated reasons. Of those with CLD or cirrhosis, 23.3% had this diagnosis while elevated serum alpha-fetoprotein (AFP) levels were seen in 18.9% of cases, mostly with patients having malignant lesions. Parikh et al. [8] found that hepatic malignancies often give abdominal pain and constitutional symptoms, while a significant number of benign lesions are found incidentally due to the widespread use of cross-sectional imaging. The relationship between high AFP and malignant hepatic lesions in our study is also in agreement with previous observation that AFP is still a helpful ancillary marker, but imaging remains the mainstay of diagnosis.

In the present study, there were equal numbers of benign and malignant liver lesions (50% each). The most frequent benign lesions were hemangioma (20.0%), simple hepatic cysts (11.1%), while hepatocellular carcinoma (23.3%) and hepatic metastases (20.0%) were the most common malignant lesions. These results corroborate those of Nasu et al. [6] who observed that in clinical practice hemangiomas and cysts are the most frequent benign hepatic lesions, whereas most malignant focal liver lesions are HCC and metastatic lesions. Bruegel et al. [12] also described a similar lesion distribution; accurate imaging technique is therefore crucial to differentiating these from each other as there is a significant difference in management.

The results of evaluation of conventional MRI characteristics showed that hypointensity on T1-weighted MRI was significantly more common in malignant than in benign lesions (93.3% vs. 75.6% respectively; p=0.021), while hyperintensity on T2-weighted MRI was seen in both groups with no significant difference (86.7% vs. 84.4% respectively; p=0.754). Most importantly, the margins of the lesions were irregular in 77.8% of the malignant cases and 17.8% of the benign cases, respectively (p<0.001), and the enhancement pattern was malignant in 86.7% of cases and benign in 13.3% (p<0.001). These results concur with the results of Taouli et al. [3] and Koh et al. [5] who showed that traditional MRI imaging can provide useful morphological information, however, the high overlap in the T1 and T2 signal characteristics can make it difficult to confidently classify benign and malignant lesions. Conventional MRI findings that are most useful in identifying malignancy include irregular margins and characteristic enhancement patterns.

The major finding of the present study was the excellent performance of diffusion-weighted MRI in lesion characterization. There was a significant difference in diffusion restriction between malignant lesions (93.3%) and benign lesions (20.0%) (p<0.001) and also lesion conspicuity on DWI was significantly better in malignant lesions (95.6%) than in benign lesions (46.7%). As reported by Nasu et al. [6] these observations are very supportive, as they reported that metastatic liver tumors were more conspicuous on DWI, due to suppression of background hepatic signal, increasing the visibility of the tumors. In a similar manner, Parikh et al. [8] showed that DWI performed better than traditional T2-weighted imaging in the detection of focal lesions in the liver and achieved higher contrast between lesion and liver, emphasizing the advantages of DWI for the detection of hepatocellular carcinoma. Our study further validates the previous findings that the higher conspicuity is a result of DWI's ability to take advantage of differences in mobility of water molecules in highly cellular malignant tissues. For benign cystic lesions, in contrast, there was no diffusion restriction, likely due to unrestricted movement of water, which aided in distinguishing them from the malignant lesions.

The overall diagnostic performance of diffusion-weighted MRI was excellent in the present study, with a sensitivity of 93.3%, specificity of 80.0%, positive predictive value of 82.4%, negative predictive value of 92.3%, diagnostic accuracy of 86.7%, and AUC of 0.931 with an optimal ADC cut-off value of 1.24×10^{-3} mm^2/s ($p<0.001$). Bruegel et al. reported similar diagnostic performance, with a sensitivity >90% for DWI in the detection of malignant focal liver lesions. Taouli et al. also reported high diagnostic accuracy with DWI and ADC quantification, stating that the combination greatly enhanced the ability to differentiate benign from malignant liver lesions from conventional MRI. The slightly lower specificity for the present study may be due to the overlapping diffusion characteristics of liver inflammatory lesions (including liver abscesses) and of some hypercellular benign lesions that may sometimes also show restricted diffusion.

Overall, the findings of the present study support previous evidence that diffusion-weighted MRI is a valuable non-invasive imaging technique for the characterization of focal liver lesions. Traditional MRI offers superior anatomical and morphological data, but when combined with DWI and quantitative ADC analysis, lesion detection, differentiation and diagnostic confidence is greatly increased. The present findings are consistent with earlier studies that showed that the ADC value of malignant lesions is less than that of benign lesions and that malignant lesions have increased diffusion restriction, which further underscores the use of DW-MRI for differential diagnosis of focal liver lesions in liver MRIs.

Conclusion

In the present study, diffusion-weighted magnetic resonance imaging (DW-MRI) is shown to be a valuable and reliable non-invasive imaging modality for characterization and differential diagnosis of focal liver lesions. The use of diffusion-weighted imaging in conjunction with conventional MRI is highly useful in the detection of lesions, as well as in increasing the conspicuity of the lesions and in raising the diagnostic confidence to help differentiate benign lesions from malignant lesions of the liver. The quantitative apparent diffusion coefficient (ADC) measurement is an important functional biomarker and is complementary to the morphological assessment, which helps to make more accurate tissue characterization. ADC values are systematically seen to be lower and diffusion restriction higher in malignant lesions than in benign lesions, suggesting the use of diffusion weighted imaging in the differentiation between different focal liver pathologies with clinical utility. While anatomical assessment is fundamental in MRI, DW-MRI can significantly enhance overall diagnostic utility and aid in making more precise clinical decisions. Hence, DW MRI should be performed routinely as part of liver MR as it would enable early diagnosis, guide the appropriate therapeutic plan and improve the management of the patient, potentially avoiding unnecessary invasive diagnostic procedures in focal lesions of the liver.

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