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COMPARISON OF WHOLE-BODY DIFFUSION WEIGHTED MRI AND 18F FDG PET/CT IN THERAPY RESPONSE ASSESSMENT OF HODGKIN'S LYMPHOMA IN PAEDIATRIC PATIENTS

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Abstract

Hodgkin's lymphoma (HL) is a common pediatric malignancy, and accurate assessment of therapy response is crucial for optimizing treatment outcomes. While 18F Fluorodeoxyglucose Positron Emission Tomography/Computed Tomography (18F FDG PET/CT) is widely used for this purpose, it involves ionizing radiation, which presents risks, particularly in pediatric patients. Whole-Body Diffusion-Weighted Magnetic Resonance Imaging (WB-DWI/MRI) has emerged as a promising alternative, offering a radiation-free imaging option. This study aims to compare the effectiveness of WB-DWI/MRI and 18F FDG PET/CT in evaluating therapy response in pediatric HL patients.

A cohort of 32 pediatric patients diagnosed with HL was selected. Each patient underwent imaging with both WB-DWI/MRI and 18F FDG PET/CT. Descriptive statistics and Pearson correlation were used to analyze the data and compare the results of the two imaging modalities with biopsy findings. The dominant age group in the study was 6-10 years, with a higher incidence in males. Tumor classification based on Standardized Uptake Value (SUV) from PET and Apparent Diffusion Coefficient (ADC) values from MRI was compared with biopsy results. Of the 29 positive biopsy cases, PET/CT identified 9 as normal, 4 as benign, and 16 as malignant, while WB-DWI/MRI identified 10 as normal, 7 as benign, and 12 as malignant. Pearson correlation analysis revealed a significant positive association between lymphoma classification by PET/CT and DWI MRI, indicating that both imaging techniques provide comparable assessments of disease, with high metabolic activity on PET correlating with restricted diffusion on DWI MRI.

WB-DWI/MRI shows potential as a reliable, radiation-free alternative for assessing therapy response in pediatric HL patients. Given its comparable *diagnostic accuracy to 18F FDG PET/CT, WB-DWI/MRI could be integrated into clinical practice to minimize radiation exposure. However, further large-scale studies are necessary to confirm these findings and establish WB-DWI/MRI as a standard diagnostic tool.*

INTRODUCTION

Lymphomas are among the most common malignant tumors in pediatric patients, accounting for approximately 5–6% of all childhood malignancies. Hodgkin's lymphoma (HL) is the third most common childhood malignancy, with incidence varying based on age, gender, and geographic region (Albano et al., 2021). HL represents 13% of malignancies in adolescents and accounts for 0.4% of new malignancies worldwide (Spijkers et al., 2023). Accurate staging and treatment monitoring are crucial for effective HL management. The current gold standard for staging is 18F-fluorodeoxyglucose positron emission tomography/computed tomography (18F-FDG PET/CT), which has a high sensitivity (87.5%) and specificity (85.6%) in detecting nodal disease (Baranska et al., 2019). However, PET/CT is associated with high radiation exposure, raising concerns about secondary malignancies in pediatric patients who undergo multiple scans during treatment (Latifoltojar et al., 2019). Whole-body magnetic resonance imaging (WB-MRI) with diffusion-weighted imaging (DWI) has emerged as a radiation-free alternative that provides functional and metabolic tumor assessment (Maccioni et al., 2023). DWI utilizes apparent diffusion coefficient (ADC) mapping, which correlates with tumor cellularity and is comparable to the standardized uptake values (SUVs) derived from PET/CT (Hagtvedt et al., 2015).

Whole-body MRI-DWI has been increasingly incorporated into lymphoma staging and therapy response monitoring. It effectively differentiates between viable tumors and treatment-related changes (Shapira-Zaltsberg et al., 2020). WB-DWI has demonstrated promising results for initial staging, treatment response evaluation, and early disease assessment in pediatric HL (Littooij et al., 2014). Additionally, it provides excellent soft tissue contrast, making it a viable alternative to PET/CT (Spijkers et al., 2021).

Bone marrow biopsy (BMB) remains the gold standard for evaluating bone marrow involvement in lymphoma patients (Albano et al., 2021). However, BMB is subject to sampling error and does not always provide accurate disease information. PET/CT has demonstrated high sensitivity in detecting bone marrow involvement, leading to discussions on whether BMB is necessary for all patients (Baranska et al., 2019). Nevertheless, PET/CT has limitations, including false-positive results due to benign conditions such as reactive hyperplasia and inflammation (Morakote et al., 2024).

Given the increasing survival rates of pediatric lymphoma patients due to advancements in treatment, reducing radiation exposure from imaging is critical to preventing late radiation-induced malignancies (Theruvath et al., 2020). Recent studies have explored the potential of 18F-FDG PET/MRI as a hybrid imaging modality that combines the advantages of PET and MRI while reducing radiation exposure (Baratto et al., 2024). WB-MRI-DWI has shown comparable diagnostic performance to PET/CT in monitoring HL therapy response and may serve as a safer alternative (Verhagen et al., 2021).

Literature Review

A study evaluated the use of WB-DWI and FDG PET/MRI in monitoring treatment response in pediatric patients with Hodgkin and Non-Hodgkin lymphoma, finding excellent agreement between the two methods. This suggests that both WB-DWI and FDG PET are viable options for monitoring treatment outcomes (Baratto et al., 2024).

In a prospective multicenter study, WB-MRI and FDG PET/CT were compared in early response assessment and restaging of pediatric Hodgkin lymphoma (HL). The study concluded that WB-MRI, particularly when enhanced with diffusion-weighted imaging (DWI), improved agreement with FDG PET/CT for early response assessment, although inconsistencies were observed in 30% of patients in detecting residual disease (Spijkers et al., 2021).

Another prospective study compared WB-MRI to a multi-modality reference standard, including FDG PET/CT, for initial staging and interim response monitoring of pediatric and adolescent HL. The findings indicated good agreement in staging, but WB-MRI tended to underestimate disease response, despite showing reasonable accuracy in nodal and extra-nodal staging (Latifoltojar et al., 2019).

A feasibility study investigated the use of diffusion-weighted imaging with background body signal suppression (DWIBS) in staging pediatric HL, comparing it to FDG PET/CT. The study found strong agreement between the two imaging modalities, suggesting that DWIBS could be a viable alternative for identifying Hodgkin lymphoma in pediatric patients (Baranska et al., 2019).

In another study, a prospective comparison of whole-body MRI, including DWI, with FDG-PET/CT for staging pediatric lymphoma indicated that WB-MRI-DWI could be a viable staging option for pediatric lymphoma, potentially serving as a radiation-free alternative to FDG-PET/CT (Littooij et al., 2014).

Objective

1. To compare the diagnostic efficiency of bone marrow biopsy and diffusion weighted whole body MRI in staging of Hodgkin's lymphoma in pediatric patients. As if DWI MRI can replace bone marrow biopsy.
2. To compare the results of PET CT and diffusion weighted MRI in patients diagnosed with Hodgkin's lymphoma who don't show complete response to therapy at interim.
3. To find the correlation between ADC values of DW MRI and SUV (max) of PET CT.

Operational Definitions:

Diffusion Weighted Imaging (DWI):A type of magnetic resonance imaging called diffusion-weighted imaging (DWI) measures the random Brownian motion of water molecules inside a tissue voxel. Diffusion coefficients are generally lower in highly cellular tissues or those with cellular swelling. Diffusion is very helpful for characterizing tumors.

B Value: Diffusion-weighted imaging (DWI) in magnetic resonance imaging (MRI) is measured by the b value, which also indicates the amplitude (G), time of applied gradients (δ), and interval between the paired gradients (Δ).

It is calculated as:

$b = \gamma^2 G^2 \delta^2 (\Delta - \delta/3)$

- As a result, extending the time between paired gradient pulses and raising the gradient's amplitude and duration will result in a higher b value.
- Higher b values (e.g., b = 500 s/mm2) are needed to detect slower moving water molecules and shorter diffusion distances.

Apparent Diffusion Coefficient (ADC): It is a measurement of the amount of diffusion (of water molecules) in tissue and is typically computed clinically with diffusion-weighted imaging (DWI) on magnetic resonance imaging (MRI).

Ann Arbor staging system: It was the revolutionary approach for classifying lymphoma stage in Hodgkin lymphomas.

Staging System:

- Stage I: involvement of one extra lymphatic organ or location, or one lymph node region
- Stage II: localized involvement of an extra lymphatic organ or location, or involvement of two or more lymph node regions on the same side of the diaphragm
- Stage III: both sides of the diaphragm's lymph node areas or structures are involved.
- Stage IV: one or more extra lymphatic organs are involved diffusely or widely, or either:
    - Isolated involvement of extra lymphatic organs with illness in distant locations, but without involvement of nearby regional lymph nodes
    - Involvement of the pleura, cerebrospinal fluid, liver, or bone marrow.

Positron Emission Tomography (PET): It is a contemporary non-invasive imaging method for measuring radioactivity in vivo. A positron-emitting radiopharmaceutical is injected intravenously, the patient is given time for systemic distribution, and then the patient is scanned to look for and measure patterns of radiopharmaceutical accumulation in the body.

Methodology:

1. Study Design: Cross-Sectional Descriptive Study

2. Setting: Data will be collected from Children Hospital, Lahore.

3. Study Duration: Date will be collected in time duration of 6 Months.

4. Sampling Technique: Non- random purposive sampling technique.

5. Sample size: 35

$$n=\frac{\left\{z_{1-a/2}\sqrt{2\bar{P}(1-\bar{P})}+z_{1-\beta}\sqrt{P_1(1-P_1)+P_2(1-P_2)}\right\}^2}{(P_1-P_2)^2}$$

n= 35

6. Selection Criteria

1. Inclusion Criteria:

1.a. Pediatric patients (aged 0-18 years) diagnosed with Hodgkin's lymphoma not showing complete response at interim.

1.b. Patients undergoing therapy response assessment using both Whole Body Diffusion Weighted MRI (WB-DW-MRI) and 18F FDG PET/CT.

2. Exclusion Criteria: 2.a. Pediatric patients (aged 0-18 years) diagnosed with Hodgkin's lymphoma showing complete response at interim.

2.b. Patients with non-Hodgkin's lymphoma or other types of cancer.

2.c. Patients with contraindications to MRI or PET/CT (e.g., metal implants, claustrophobia).

2.d. Ethical consideration:

All participants in research must take part voluntarily, free from any concoction or undue influence, and their rights, dignity and autonomy should be respectful and appropriately protected. An autonomous person is capable of deliberation about personal goals and of acting under the direction of such deliberation.

7. Data Collection Procedure:

The data was collected through questionnaire and by performing PET and MRI. After taking the consent form, they were enrolled in the study.

8. Data Analysis:

The data were entered and analyzed by using the statistical package SPSS (version 25). Quantitative data were present as Mean and Standard deviation while a Receiver Operating Curve was draw through SPSS. Data were interpreted in the form of graphs and tables.

Results:

Demographics

Age

Age	Frequency	Percent
1-5 years	9	28.1
6-10 years	14	43.8
11-16 years	9	28.1
Total	32	100.0

Table 1: Age Distribution of sample

Table 4.1 presents the age distribution of the data. As shown in the table out of 32 participants, 9 participants fall within the 1–5 years' age group, 14 are between 6–10 years, and 9 belong to the 11–16 years' category. The dominant age group of this study is 6-10 years.

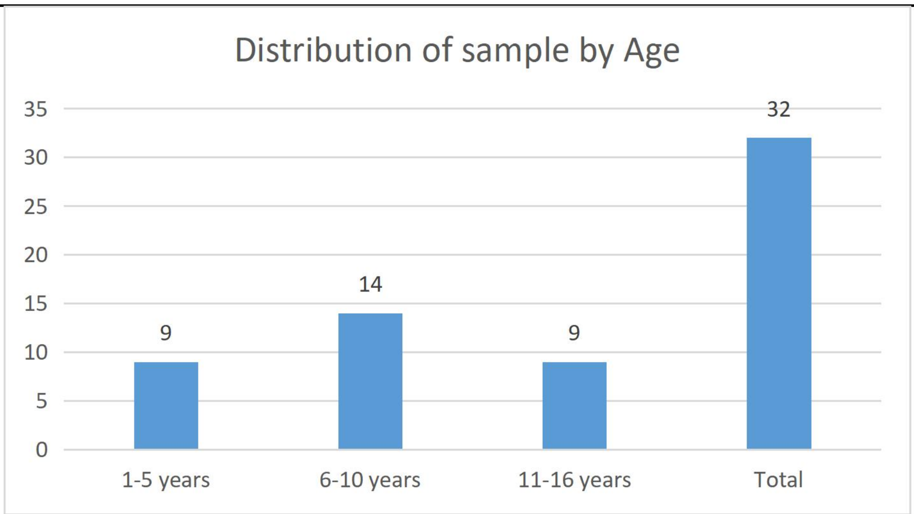

Figure 1: Bar-chat of age distribution.

Gender

Table 2: Gender distribution of data

Gender	Frequency	Percent
Male	22	68.8
Female	10	31.3
Total	32	100.0

Table 2 is showing the gender distribution of data. Out of 32 patients, 22 are male and 10 are females. So, majority patients are male according to the data. Fig. 4.1.2 is showing this analysis in the form of Bar-chart.

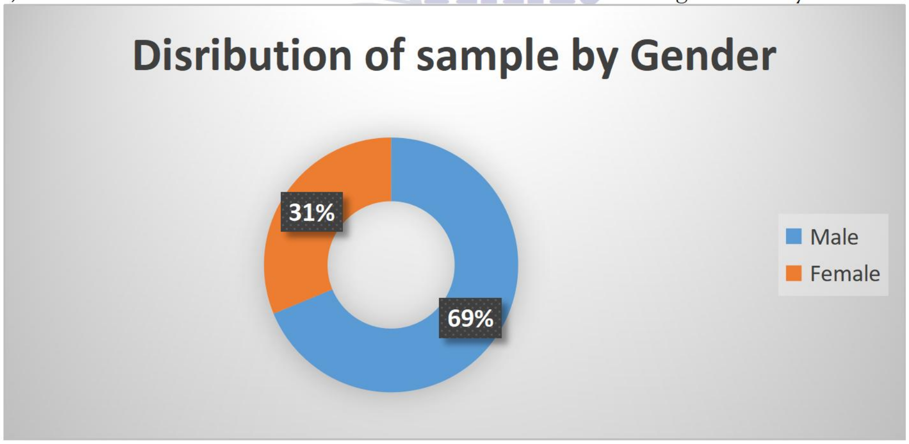

Figure 2: Pie-chart of gender distribution.

MRI Findings

Lymph node enlargement

Table 3: frequency of the pattern of lymph node enlargement on DWI MRI

Lymph node enlargement	Frequency	Percent
Discrete	16	50.0
Mass Like	16	50.0
Total	32	100.0

Table 3 is showing the pattern of lymph node enlargement on DWI MRI. Out of 32 patients, 16 showed discrete pattern of lymph node enlargement and 16 showed mass like pattern of lymph node enlargement.

Organ involvement

Table 4: organ involvement of disease on DWI MRI.

Organ involvement	Frequency	Percent
Enlarged only	23	71.9
Enlarged with focal deficit	9	28.1
Total	32	100.0

Table 4 is showing organ involvement of disease in the patients. Out of 32 patients, 23 have only enlarged lymph nodes whereas, 9 have enlarged lymph nodes with focal deficit.

Bone marrow infiltration

Table 5: bone marrow infiltration on DWI MRI

Bone marrow infiltration	Frequency	Percent
Yes	9	28.1
No	23	71.9
Total	32	100.0

Table 5 is showing bone marrow infiltration in the patients. Out of 32 patients, 9 showed bone marrow infiltrations on MRI, whereas, 23 didn't show bone barrow infiltrations.

Necrosis or Cyst Formation

Table 6: frequency of necrosis or cyst formation on DWI MRI

Necrosis or cyst formation	Frequency	Percent
No	32	100.0

Table 6 is showing the frequency of necrosis or cyst formation in the patients. Out of 32 patients, no one showed necrosis or cyst formation on MRI.

Type of lymphoma according to apparent diffusion co-efficient (ADC) value

Table 7: the frequency of lymphoma types on the basis of ADC value

Type of lymphoma according to apparent diffusion co-efficient (ADC) value	Frequency	Percent
normal	12	37.5
Benign	8	25.0
Malignant	12	37.5
Total	32	100.0

Table 7 is showing the frequency of lymphoma types on the basis of ADC value. Out of 32 patients, 12 fall under the category of normal lymph nodes, 8 have benign lymphoma and 12 have malignant lymphoma.

PET Findings

Organ involvement

Table 8: frequency of organ involvement on PET CT

Organ involvement	Frequency	Percent
Present	14	43.8
Absent	18	56.3
Total	32	100.0

Table 8 is showing organ involvement of lymphoma on PET scan. Out of 32 patients, organ involvement was noted in 14 patients, whereas, 18 didn't show organ involvement.

Bone marrow infiltration

Table 9: frequency of bone marrow infiltration on PET CT

Bone Marrow Infiltration	Frequency	Percent
Present	15	46.9
Absent	17	53.1
Total	32	100.0

Table 9 is showing the frequency of bone marrow infiltration on PET CT. Out of 32 patients, bone marrow infiltration was present in 15 patients and 17 didn't showed any bone marrow infiltrations.

Lymph Node Enlargement

Table 10: Frequency of lymph node enlargement pattern on PET CT.

Lymph Node Enlargement	Frequency	Percent
Discrete	17	53.1
Mass Like	15	46.9
Total	32	100.0

Table 10 is showing the frequency of lymph node enlargement pattern on PET CT. Out of 32 patients, 17 showed discrete pattern of lymph node enlargement and 15 showed mass like pattern.

Necrosis or cyst formation

Table 11: frequency of necrosis or cyst formation on PET CT.

Necrosis or cyst formation	Frequency	Percent
No	32	100.0

Table 11 is showing the frequency of necrosis or cyst formation on PET CT. Out of 32 patients, no one showed necrosis or cyst formation on PET CT.

Type of lymphoma according to Standardize Unit Value (SUV) uptake

Table 12: frequency of lymphoma type on the basis of SUV uptake

Type of lymphoma according to Standardize Unit Value (SUV) uptake	Frequency	Percent
Normal	11	34.4
Benign	4	12.5
Malignant	17	53.1
Total	32	100.0

Table 12 is showing the frequency of lymphoma type on the basis of SUV uptake. Out of 32 patients, 11 showed normal lymph nodes, 4 showed benign lymphoma and 17 showed malignant lymphoma.

Biopsy findings

Table 13 the frequency of biopsy findings.

Biopsy findings	Frequency	Percent
Positive	29	90.6
Negative	3	9.4
Total	32	100.0

Table 13 showing the frequency of positive or negative biopsy findings. Out of 32 patients, 29 have positive biopsy findings and 3 have negative biopsy findings.

Age-wise distribution of Lymphoma categorization according to SUV

Table 14: age-wise distribution of lymphoma type on the basis of SUV uptake

		Categorization of lymphoma according to Standardize Unit Value			Total
		Normal	Benign	Malignant	
Age	1-5 years	5	2	2	9
	6-10 years	3	2	9	14
	11-16 years	3	0	6	9
Total		11	4	17	32

Table 14 is showing the age-wise distribution of lymphoma type on the basis of SUV uptake. Table shows that out of 9 patients in the age range of 1-5 years, 5 have normal lymph nodes, 2 have benign lymphoma and 2 have malignant lymphoma. Furthermore, out of 14 patients in the age range of 6-10 years, 3 have normal lymph nodes, 3 have benign lymphoma and 9 have malignant lymphoma. Moreover, out of 9 patients in the age range of 11-16 years, 3 have normal, 0 have benign and 6 have malignant lymphoma.

Gender-wise distribution of Lymphoma type according to SUV uptake

Table 15: frequency of gender-wise distribution of lymphoma type on the basis of SUV uptake

		Categorization of lymphoma according to Standardize Unit Value			Total
		Normal	Benign	Malignant	
Gender	Male	6	2	14	22
	Female	5	2	3	10
Total		11	4	17	32

Table 15 is showing the frequency of gender-wise distribution of lymphoma type on the basis of SUV uptake. Out of 22 male patients, 6 have normal lymph nodes, 2 have benign and 14 have malignant lymph nodes. On the other hand, out of total 10 females, 5 showed normal, 2 showed benign and 3 showed malignant lymphoma.

Age-wise distribution of Lymphoma type on the basis of ADC value

Table 16: Age-wise distribution of lymphoma type on the basis of ADC value

		Categorization of lymphoma according to apparent diffusion co-efficient (ADC) value			Total
		Normal	Benign	Malignant	
Age	1-5 years	6	2	1	9
	6-10 years	3	4	7	14
	11-16 years	3	2	4	9
Total		12	8	12	32

Table 16 is showing age-wise distribution of lymphoma type on the basis of ADC value. Table shows that out of 9 patients in the age range of 1-5 years, 6 have normal lymph nodes, 2 have benign lymphoma and 1 have malignant lymphoma. Furthermore, out of 14 patients in the age range of 6-10 years, 3 have normal lymph nodes, 4 have benign lymphoma and 7 have malignant lymphoma. Moreover, out of 9 patients in the age range of 11-16 years, 3 have normal, 2 have benign and 4 have malignant lymphoma.

Gender-wise distribution of Lymphoma type according to ADC value

Table 17: Gender-wise distribution of Lymphoma type according to ADC value

		Categorization of lymphoma according to apparent diffusion co-efficient value			Total
		Normal	Benign	Malignant	
Gender	Male	6	5	11	22
	Female	6	3	1	10
Total		12	8	12	32

Table 17 is showing gender-wise distribution of Lymphoma type according to ADC value. Out of 22 male patients, 6 have normal lymph nodes, 5 have benign and 11 have malignant lymph nodes. On the other hand, out of total 10 females, 6 showed normal, 3 showed benign and 1 showed malignant lymphoma.

Comparison between DWI MRI and PET

Table 18: the cross-tabulation between lymphoma type on the basis of SUV uptake and biopsy findings

		Biopsy finding		Total
		Positive	Negative	
Lymphoma categorization according to Standardize Unit Value	Normal	9	2	11
	Benign	4	0	4
	Malignant	16	1	17
Total		29	3	32

Table 18 is showing the cross-tabulation between lymphoma type on the basis of SUV uptake and biopsy findings. According to the results, out of 29 patients that have positive biopsy findings, 9 showed normal lymph nodes, 4 showed benign lymphoma and 16 showed malignant lymphoma on PET CT. furthermore, out of 3 patients that have negative biopsy findings, 2 showed normal lymph nodes and 1 has malignant results on PET CT.

Table 19: the cross-tabulation between lymphoma type on the basis of ADC value and biopsy findings

		Biopsy finding		Total
		Positive	Negative	
Lymphoma categorization according to apparent diffusion co-efficient value	Normal	10	2	12
	Benign	7	1	8
	Malignant	12	0	12
Total		29	3	32

Table 19 is showing the cross-tabulation between lymphoma type on the basis of ADC value and biopsy findings. According to the results, out of 29 patients that have positive biopsy findings, 10 showed normal lymph nodes, 7 showed benign lymphoma and 12 showed malignant lymphoma on DWI MRI. Furthermore, out of 3 patients that have negative biopsy findings, 2 showed normal lymph nodes and 1 has benign results on DWI MRI.

The results of table 18 and 19 clearly showed that both PET CT and DWI MRI have almost similar results in categorizing the type of lymphoma. Therefore, DWI MRI should be considered as a good replacement of PET CT because of no radiation dose benefit of MRI.

Descriptive statistics

Table 20: Descriptive statistics of Lymphoma categorization according to Standardize Unit Value and Lymphoma categorization according to apparent diffusion co-efficient value.

	N	Minimum	Maximum	Mean
Lymphoma categorization according to Standardize Unit Value	32	1.00	3.00	2.1875
Lymphoma categorization according to apparent diffusion co-efficient value	32	1.00	3.00	2.0000

Table 20 is showing the descriptive statistics of Lymphoma categorization according to Standardize Unit Value and Lymphoma categorization according to apparent diffusion co-efficient value. Results showed that PET CT showed mean of 2.1875 and DWI MRI showed a mean of 2.0000. This indicated that results of both modalities are almost equal and both are equally good in detection of lymphomas. Therefore, DWI MRI should be preferred in place of PET CT in patients.

Pearson correlation

Table 21: Pearson correlation analysis

	Lymphoma categorization according to Standardize Unit Value	Lymphoma categorization according to apparent diffusion co-efficient value
Lymphoma categorization according to Standardize Unit Value	1	.866**
Lymphoma categorization according to apparent diffusion co-efficient value	.866**	1
**. Correlation is significant at the 0.01 level (2-tailed).		

Table 21 is showing Pearson correlation analysis. It revealed a significant positive correlation between Lymphoma categorization according to Standardize Unit Value and Lymphoma categorization according to apparent diffusion co-efficient value. The results demonstrated a strong and statistically significant positive correlation between these two variables indicating that both are showing same results in the patients. This suggests that both imaging modalities provide comparable assessments of disease, with high metabolic activity on PET/CT corresponding to restricted diffusion on DWI MRI. These findings support the potential interchangeability of DWI MRI and PET/CT in evaluating lymphoma progression and treatment response. Therefore, DWI MRI can be used in children to keep them safe from excess radiation dose.

Discussion

For the assessment of Hodgkin's lymphoma in children, 18F FDG PET/CT is considered as gold standard test. However, its drawback is that children will expose to high radiation dose, one source of radiation is radiopharmaceutical used in the study and other source is x-ray emitted from CT machine. On the other hand, DWI MRI is also considered in assessment of lymphoma and its benefit is that MRI is free of radiation. For comparing the findings of 18F FDG PET/CT and DWI-MRI, we have collected data from Children's Hospital Lahore and noted the findings of PET CT, DWI MRI and biopsy. Results showed that most dominant age group of our study is 6-10 years. And males were dominant in the study as compared to females. Furthermore, we have categorized tumor type on the basis of SUV uptake (PET) and ADC value (MRI) and compared the results with biopsy findings. It is noted that biopsy findings were positive in 29 patients and out of these 29, PET CT showed 9 as normal, 4 benign and 16 malignant. Moreover, 3 patients have negative biopsy findings, out of these 3, 2 showed normal and 1 showed malignant results in PET CT.

On the other hand, it is noted that biopsy findings were positive in 29 patients and out of these 29, DWI MRI showed 10 as normal, 7 benign and 12 malignant. Moreover, 3 patients have negative biopsy findings, out of these 3, 2 showed normal and 1 showed benign result in DWI MRI.

Descriptive statistics of these two variables showed that results of both modalities are almost equal and both are equally good in detection of lymphomas. Pearson correlation was also performed and it revealed a significant positive correlation between Lymphoma categorization according to Standardize Unit Value and Lymphoma categorization according to apparent diffusion co-efficient value. This suggests that both imaging modalities provide comparable assessments of disease, with high metabolic activity on PET/CT corresponding to restricted diffusion on DWI MRI.

The results of our study are similar to the study of Morakote et al. (2023). In this study, a total of 45 children and young adults with Hodgkin lymphoma (n = 20) were retrospectively and non-randomized analyzed at a single center, conducted between February 2018 and October 2022, using serial simultaneous WB-DWI and [18F] FDG PET/MRI scans, with ages ranging from 1 to 21 years. Excellent agreement was observed between response assessments by WB-DWI and [18F] FDG PET/MRI after therapy completion (Morakote et al., 2023).

Similarly, the results of the study conducted by Smith et al. (2020) are also similar to the present study's results. They conducted a prospective study to evaluate whole-body diffusion-weighted imaging (WB-DWI) magnetic resonance imaging (MRI) against 18F-FDG positron emission tomography (PET)/CT in assessing treatment outcomes in pediatric patients with Hodgkin lymphoma. The study involved 50 pediatric patients (aged 5-18 years) undergoing therapy for Hodgkin lymphoma. Residual disease identification by WB-DWI MRI confirmed a high concordance with that of 18F-FDG PET/CT. WB-DWI MRI had better performance in cases where metabolic activity decreased but structural abnormalities persisted. The authors concluded that WB-DWI MRI could serve as an alternative for radiation-free outcome evaluations (Smith et al., 2020).

Another study that showed high similarity with our study's results was conducted by Zells et al. (2024), who carried out a single-center prospective research. A comparison between WB-DWI MRI and 18F-FDG PET/CT was done to determine interim and end-of-therapy responses in pediatric non-Hodgkin lymphomas. Data were extracted from 30 patients aged between 2 and 17 years, and excellent inter-modality agreement (kappa = 0.85) was found, with slightly fewer false-positive reports of treatment-related inflammatory changes using WB-DWI MRI. The findings suggested that WB-DWI MRI could serve as a non-ionizing alternative to PET/CT in low- and intermediate-risk Hodgkin lymphoma cases (Zells et al., 2024).

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