Original Article Research Journal of Health Sciences

A cliniccopathologic correlation study of 2396 histopathologic skin biopsy specimens

***Anaba, E.L.[1], Dawodu, O.O.[2], Arabambi, A.[3]**

Abstract

Background: Clinicopathologic correlation of skin biopsies is relevant in a dermatology patient's management. The study aimed to conduct a clinicopathologic corellation of skin samples.

Methods: Retrospective cross-sectional analysis of 2,396 skin biopsy specimens submitted between January 2015 and December 2021. Clinicopathologic correlation was done on only samples which had definitive clinical and histopathologic diagnosis. Data was analyzed with the R studio.

Results: A total number of 2,396 skin biopsies were received from 2319 patients. Clinicopathologic correlation was conducted on 1,831 samples which had both definitive clinical and histopathological diagnoses. A definitive clinicopathologic correlation was obtained in 66.8% (1224/1831) and this was 64.8% for benign tumours, 60.4% for malignant tumours, 66.7% for inflammatory diseases, 70.8% for infections, 85.5% for scalp and hair disorders and 50% for dermal deposits.

Conclusion: Clinicopathologic correlation of skin biopsies is high. Correlation is better with inflammatory diseases compared to neoplastic diseases.

Key words: Histopathology, Dermatopathology, clinicopathologic correlation, Skin biopsy, Skin diseases.

***Corresponding author**
Anaba, E.L.
ORCID-NO: https://orcid.org/0000-0002-4502-4482
Email: ehianaba@yahoo.com

[1]Department of Medicine, Lagos State University College of Medicine/ Lagos State University Teaching Hospital, Lagos, Nigeria.
[2]Department of Anatomic and Molecular Pathology, College of Medicine, University of Lagos, Lagos, Nigeria.
[3]Calgary Stroke Program, Department of Clinical Neurosciences, University of Calgary, Alberta, Canada.

Received: February 9, 2022 *Accepted: April 7, 2023* *Published: April 19, 2023*

http://dx.doi.org/10.4314/rejhs.v11i1.3

Article Original Research Journal of Health Sciences

Une étude de corrélation clinicopathologique de 2396 échantillons de biopsie cutanée histopathologique

***Anaba, E.L.[1], Dawodu, O.O.[2], Arabambi, A.[3]**

Résumé

Contexte général de l'étude: La corrélation clinicopathologique des biopsies cutanées est pertinente dans la prise en charge d'un patient en dermatologie. L'étude visait à mener une étude clinicopathologiquecorrélation d'échantillons de peau.

Méthode de l'étude: Analyse transversale rétrospective de 2 396 échantillons de biopsie cutanée soumis entre janvier 2015 et décembre 2021. La corrélation clinicopathologique a été effectuée uniquement sur les échantillons qui présentaient un diagnostic clinique et histopathologique definitive. Les données ont été analysées avec le studio R.

Résultat de l'etude: Un nombre total de 2 396 biopsies cutanées ont été reçues de 2 319 patients. La corrélation clinicopathologique a été réalisée sur 1 831 échantillons qui présentaient à la fois des diagnostics cliniques et histopathologiques définitifs. Une corrélation clinicopathologique définitive a été obtenue dans 66,8% (1224/1831) et celle-ci était de 64,8% pour les tumeurs bénignes , 60,4% pour les tumeurs malignes , 66,7% pour les maladies inflammatoires, 70,8% pour les infections, 85,5% pour les affections du cuir chevelu et des cheveux et 50% pour les dépôts dermiques.

Conclusion: La corrélation clinicopathologique des biopsies cutanées est élevée. La corrélation est meilleure avec les maladies inflammatoires qu'avec les maladies néoplasiques.

Mots-clés : Histopathologie, dermatopathologie , corrélation clinicopathologique, biopsie cutanée, maladies cutanées.

***Corresponding author**
Anaba, E.L.
ORCID-NO: https://orcid.org/0000-0002-4502-4482
Email: ehianaba@yahoo.com

[1]Department of Medicine, Lagos State University College of Medicine/ Lagos State University Teaching Hospital, Lagos, Nigeria.
[2]Department of Anatomic and Molecular Pathology, College of Medicine, University of Lagos, Lagos, Nigeria.
[3]Calgary Stroke Program, Department of Clinical Neurosciences, University of Calgary, Alberta, Canada.

Received: February 9, 2022 *Accepted: April 7, 2023* *Published: April 19, 2023*

http://dx.doi.org/10.4314/rejhs.v11i1.3

INTRODUCTION

Skin diseases are common and account for 10.73 to 27 % of medical complaints (1-3). Although most skin diseases can be diagnosed clinically, skin diseases have a limited pattern of clinical presentation making the conclusive diagnosis of some cases difficult (4). Skin biopsies and histopathologic evaluation remain the gold standard in the resolution of difficult clinical cases by the dermatologist (4,5). A good clinical description by the dermatologist influences the outcome of a histopathology report. Likewise, a good histopathology report imparts greatly on the clinical outcome of a patient's management (5).

The studies on the histopathologic correlation of clinical diagnosis made of skin disease show a correlation of 23.3% to 94.9% (4,6-9). These studies also reveal a correlation between the histopathologic and the first clinical diagnosis in 47.4 to 82.3% and a correlation with the clinical differential diagnosis in 7.4 to 13.9% (10,11). Furthermore, a higher correlation is reported when the clinical diagnosis is made by dermatologists.

In resource poor countries with a limited number of dermatopathologists, histopathological evaluation of skin samples remains a daunting task. A clinicopathologic correlation (CPC) of skin biopsies in this setting becomes relevant in patient management. In Nigeria, studies of the histopathology of skin diseases are few and even fewer are the CPC of these diseases. The aim of this study was to conduct a CPC on the largest collection of skin samples recorded till date in the region with a view to improving the clinical diagnostic outcome in the field of dermatology.

MATERIALS AND METHODS.

This retrospective cross-sectional analysis of skin biopsy specimens submitted to the laboratory between the January 1st 2015 and December 31st 2021 was conducted over a six-week period, April to May 2022. The study was conducted at the ClinaLancet laboratory in Lagos, Nigeria following permission to conduct the study by the managers of the laboratory and ethical approval from the Lagos State University Teaching Hospital, Lagos State (LREC/06/10/1837). A list of all skin biopsies submitted within the study period was retrieved from the data base of the laboratory for the documentation of sociodemographic, clinical and histopathological data.

Sociodemographic data retrieved included age, gender, duration of disease and anatomical site of biopsy. For the CPC data retrieved were; clinical and histopathological diagnosis, type of histopathological diagnosis. The histopathologic diagnosis was classified into non-neoplastic and neoplastic.

The non-neoplastic skin lesions were further classified into:

- Inflammatory lesions (spongiotic, vesicullobullous, lichenoid, psoriasisiform, vasculopathic, granulomatous and panniculitis)
- Infectious and parasitic
- Cutaneous deposits
- Alopecias and scalp disorders.
- Nail disorders

The neoplastic skin lesions were further classified into benign and malignant.

The clinical diagnosis, histopathology report as well as histopathologic diagnoses were documented in an excel sheet and clinicopathologic correlation (CPC) was conducted as follows:

- A definitive clinicopathologic correlation was reported when the definitive clinical and definitive histopathological diagnosis matched.
- Partial correlation was defined when the definitive histopathological diagnosis was included as one of the clinical differential diagnosis.
- No correlation was defined when the histopathological diagnosis did not match the definitive clinical diagnosis or any of its differential diagnosis.

Exclusion criteria from CPC

- Specimens without a definitive clinical diagnosis
- Specimens without a clinical diagnosis
- Specimens without definitive histopathological diagnosis
- Specimens in which a histopathologic diagnosis was not made because the biopsy was superficial or insufficient.
- Biopsies with a normal histopathological diagnosis.

Collected data was inputted into Microsoft Excel and analyzed using R studio. Categorical variables were summarized as frequencies and percentages while numerical variables were summarized as mean and standard deviation. Cross tabulations were constructed to describe the subcategories of broad diagnosis types and

the distribution of lesion types that had a clinicopathologic correlation.

RESULTS

A total number of 2,396 skin biopsies were received within the study period from 2,319 patients. The studied population was 46.4 % (1,046) male and female in 53.6% (1,209). The age of the patients ranged from 6 months to 100 years and the mean (SD) age was 39.82±16.83 years. Individuals aged 31-60 years accounted for most of the study population. The mean (SD) lesion duration was 3.52 ± 5.1 years. Multiple biopsies were conducted in 121 (5.4%) patients and the most biopsied site was the lower limb (21.5%). Table 1

A differential clinical diagnosis was not offered in 1,052 (46.7%) of the samples. A total of 424 reports were excluded from the clinicopathologic correlation (CPC) analysis for; lack of definitive clinical diagnosis in 330 (14.6%), no definitive histopathological diagnosis in 119 (5.3 %). Histopathological evaluation was neoplastic in 818 (36.3%) with 758 (92.6%) benign and 60 (7.4%) malignant. An inflammatory diagnosis was made in 975 (43.2%) samples, hair loss and scalp disorders in 93 (4.1%), dermal deposits in 35 (1.6%), miscellaneous (diseases with no specific classification eg keratoderma, ichthyosis, ulcers) in 84 (3.7%) and a normal biopsy in 79 (3.5%). A total of 206 (9.1%) diagnoses of infections were made; viral in 186 (90.3%), parasitic in 9 (4.3%), mycobacterial in 6 (2.9%) and fungal in 5 (2.4%).

The most common benign neoplastic diseases were adnexal (including cysts) in origin followed by epidermal tumours. Adnexal tumours with more than two frequencies included syringomas (13), sebaceous tumours (8), spiradenoma (7), Naevus sebaceous (5), hidradenoma (5), poromas (5), endometriosis (4), trichoepithelioma and trichoadenoma (4) and pilomatricoma (3). The most common malignant tumours were epidermal in origin. Table 2

Hair loss and scalp disorders were reported in 93 (4.1%) with hair loss being 62 (66.7%) and scalp disorders 31 (33.3%). Inflammatory lesions were predominantly spongiotic. Details are as in table 3.

Clinicopathologic correlation

Only 1,831 (81.2%) out of the 2,255 samples met the inclusion criteria for a CPC. A definitive CPC was obtained in 66.8% (1224/1831). CPC with the first clinical diagnosis was 58.3% (1067/1831) and with any other clinical diagnosis was 13.2% (241). CPC was 64.8% for benign tumours, 60.4% for malignant tumours, 66.7% for inflammatory diseases, 70.8% for infections, 85.5% for scalp and hair disorders and 50% for dermal deposits. Tables 4 and 5.

DISCUSSION

Histopathological diagnosis of skin biopsies is the gold standard in the clinical management of dermatology patients due to the heterogeneity of clinical manifestations and diagnostic Dilemmas (4,12). The paucity of dermatopathologists in resource poor countries makes histopathological evaluation difficult (13-17). A CPC of reported cases allows the dermatologists to evaluate their clinical diagnosis and leads to better patient evaluation and management (5,14). This study shows a good CPC in over half of the samples and CPC was best with alopecia and scalp disorders.

The study population was predominantly female in keeping with a female preponderance in prevalence studies of clinical diseases and similar CPC studies (8,9). The most biopsied patients (60.8%) were aged 31-60 years in consonance with other clinical and histopathologic studies (4,8,18,19). This age group may be the most biopsied because this is the working age group and they can afford to pay out of pocket for clinic attendance. Also, this age group tend to have mostly inflammatory lesions which accounted for most of the histopathology diagnosis in this study (4,8,12,18).

There was a definite CPC in a high percentage (66.8%) of the samples. The level of CPC in this study is within the range of what is documented in similar histopathology studies (4,9,11,19,20). The CPC tends towards a high level when most of the clinical diagnosis is made by dermatologists because they are trained to recognise these lesions clinically (8,10,12,19). The level of CPC in this study was dependent on the diagnosis with alopecia and scalp disorders having the highest CPC followed by infectious diseases and inflammatory diseases. CPC tends to be high when the clinical manifestation and histopathology features of a disease are characteristic or specific. Alopecias and scalp diseases like folliculitis decalvans have characteristic clinical features and specific histopathology features which make them easily recognisable (21,22). This study differs from similar studies where inflammatory diseases and infection were noted to have the highest CP (4,10,12).

There was a better CPC with inflammatory diseases compared to neoplastic diseases. The reason for the better CPC with inflammatory diseases may be due to the clinical presentation of these lesions. Clinically, neoplastic diseases manifest mostly as swellings unlike inflammatory diseases where definite patterns of manifestations are seen. Another explanation could be the rarity of neoplastic lesions in this region and so poor awareness of its features by dermatologists (8,23). Study conclusions in literature vary when CPC of neoplastic and non-neoplastic diseases are compared. In some studies, neoplastic diseases have a higher CPC (12) while in others, it is inflammatory diseases (4) and in others there is no difference (10).

Amongst the neoplastic diseases CPC was best with the benign lesions: lipomas followed by mesenchymal and then epidermal lesions. CPC was lowest with histiocytic lesions. Histiocytic lesions (dermatofibromas, dermatofibrosarcoma protuberans, xanthomas, xanthelasma) are close differentials clinically and serve as differential diagnosis for one another leading to a poor definitive diagnosis of these disorders. In consonance with this study, Venugopal had a better correlation with benign lesions (10). George *et al* and Al-Saif *et al* in their studies were however at variance with this study as they reported a better CPC with malignant lesions (4,12).

Lichenoid, psoriasiform and granulomatous diseases had the highest CPC in the inflammatory diseases spectrum. This was not unexpected as the diseases in this spectrum have almost specific clinical patterns and definitive histopathology patterns. In consonance with this study, other authors report a similar high CPC with granulomatous, lichenoid and psoriasiform diseases (4,18).

The study was limited by the large number of samples which were excluded for lack of a definitive diagnosis (clinical and histopathologic). Also, being a retrospective study, there were some incomplete documentations. The strength of the study lies in it being the largest collection of skin samples from the region and that the histopathologic evaluation was done by a dermatopathologist.

CONCLUSION

In conclusion, clinicopathologic correlation of skin biopsies is high. Correlation is better with inflammatory diseases compared to neoplastic diseases. A histopathological evaluation of skin biopsies is important in the management of dermatology patients and a good clinical description increases the yield of histopathological correlation.

Funding: Self-funded

Conflict of interest: The authors have no conflict of interest.

Acknowledgements: The authors wish to acknowledge the management of the laboratory for granting permission to use the data and the laboratory scientists for their role in data collection.

REFERENCES

1. Richard M-A, Corgibet F, Beylot-Barry M, Barbaud A, Bodemer C, Chaussade V et al. Sex- and Age-adjusted Prevalence Estimates of Five Chronic Inflammatory Skin Diseases in France: Results of the « OBJECTIFS PEAU » Study J. Eur. Acad. Dermatol. Venereol. 2018;32:1967–1971.
2. Akinkugbe AO, Amira OC, Ozoh OB, Fasanmade O, Bandele E. Patterns of Skin Disorders in a Rural Community in Lagos State, Nigeria. The Nig. Health J. 2016;16: 103-116
3. Lim HW, Collins B, Resneck JS, Bolognia JL, Hodge JA, Rohrer TA et al. The burden of skin disease in the United States. J Am Acad Dermatol 2017;76:958-972
4. George VP, Sowmya S, Krishnan S. A Histopathological Study of Skin Biopsy Specimens in a Tertiary Care Hospital with a Keynote on Clinicopathological Correlation. Annals of Pathology and Laboratory Medicine. 2020;7:39-45
5. Puri N, Mahajan BB, Kaur S. Clinicohistopathological Correlation of Psoriasis in Acute Exacerbation. Scientific reports. 2012;1:455-461
6. Bisht M, Arya A, Choudhry BC. Histomorphological analysis and clinical correlation of neoplastic and non-neoplastic skin lesions: a study in a tertiary care centre of Western Uttar Pradesh, India. *Int J Res Med Sci. 2020;8:2820-2827*
7. Dowerah S, Naiding M. Clinicopathological correlation of benign skin lesions in a limited resource setting. *Journal of Science. 2017;7:41-43.*
8. Altraide DD, Otike-Odibi B, Usman O. Correlation of Clinico Pathologic Diagnosis of Skin Diseases in a Tertiary Health Centre in South- South Nigeria. *Asian Journal of Research in Dermatological Science.2020;3:22-28*
9. Gupta P, Karuna V, Grover K, Rathi M, Verma N. The histopathological spectrum of skin diseases with emphasis on clinicopathological correlation: A prospective study. Journal of Diagnostic Pathology and Oncology. 2018;3:91-

95
10. Venugopal R, Shankar P, Pathania V. Clinicopathological correlation in the diagnosis of skin diseases: A retrospective study. Med J DY Patil Vidyapeeth 2020;13:648-52.
11. Umarji S, Ravikumar G, Antony M, Tirumalae R. Comparison of clinical diagnosis with histopathology in inflammatory skin diseases: a retrospective study of 455 cases. Egypt J Dermatol Venereol 2018;38:37–41
12. Al-Saif FM, Binsufayan SA, Alhussain AH, Alshaikh HM, Aldosari MS, Binsufayan SA et al. Clinicopathological concordance in the diagnosis of skin diseases: a retrospective analysis of 5000 histopathology reports. *Ann Saudi Med*. 2019;39:388-394.
13. Tsang MW, Kovarik CL. Global access to dermatopathology services: physician survey of availability and needs in sub-Saharan Africa. J Am Acad Dermatol. 2010;63:346-8.
14. Beltraminelli H, Kiprono S, Zuriel D, Swai B, Giabbani E, Grossmann H, Masenga JE. Dermatopathology in sub-Saharan Africa: a systematic 5-year analysis of all histopathological diagnoses from the Regional Dermatology Training Centre (RDTC) in Moshi, Tanzania. J Eur Acad Dermatol Venereol. 2015;29:1370-1375.
15. Adeyi OA. Pathology services in developing countries: the West African experience. Arch Pathol Lab Med 2011; 135: 183–186.
16. Tsang MW, Kovarik CL. The role of dermatopathology in conjunction with teledermatology in resource-limited settings: lessons from the African Teledermatology Project. Int J Dermatol. 2011;50:150-156
17. Benediktsson H, Whitelaw J, Roy I. Pathology services in developing countries: a challenge. Arch Pathol Lab Med 2007; 131: 1636–1639.
18. Ukonu BA, Ibekwe PU, Abimiku BA. Clinicopathological Correlate of Papulosquamous Skin Disorder in a Tertiary Health Care. *Journal of Advances in Medicine and Medical Research. 2020;32:54-65*
19. Korfitis C, Gregoriou S, Antoniou C, Katsambas AD, Rigopoulos D. Skin Biopsy in the Context of Dermatological Diagnosis: A Retrospective Cohort Study Dermatology Research and Practice. 2014;Article ID 734906:5 pages
20. Goyal N, Jain P, Malik R, Koshti A. Spectrum of Non Neoplastic Skin Diseases: A Histopathology Based Clinicopathological Correlation Study. Sch. J. App. Med. Sci., 2015;3:444-449.
21. Phillips TG, Slomiany P, Allison R. Hair Loss: Common Causes and Treatment. *American Family Physician. 2017;96: 372-378.*
22. Gordon KA, Tosti A. Alopecia: Evaluation and Treatment. Clin. Cosm. Investig. Dermatol. 2011;4:101-106.
23. Asuquo ME, Ebughe G. Cutaneous cancers in Calabar, Southern Nigeria. Dermatol Online J. 2009;15:11.

Table 1. Sociodemographic and clinical variables

Variable	Frequency (n)	Percentage (%)
Age years (years)		
0-10	92	4.10
11-20	219	9.70
21-30	325	14.40
31-40	594	26.30
41-50	448	19.90
51-60	330	14.60
61-70	156	6.90
71-80	70	3.10
81-90	18	0.80
91-100	3	0.10
Total	2255	100
Duration of lesions		
(years)	547	48.70
<1	500	44.60
1-10	75	6.70
>10		
Site of biopsy		
Lower limb	484	21.50
Upper limb	328	14.50
Trunk	304	13.50
Face	259	11.50
Scalp	240	10.60
Genital	86	3.80
Gluteal	65	2.90
Neck	48	2.10
Mouth	4	0.20
Nail	2	0.10

Table 2. Frequency of histologic origin of diagnosed tumoral lesions

Origin of tumour	Benign(n=758)		Malignant (n=60)	
	n	%	n	%
Neural	20	2.6	2	3.3
Adnexal	236	31.1	3	5.0
Cyst	159	21.0	0	0.0
Lipoma	74	9.8	0	0.0
Epidermal	170	22.4	34	56.7
Histiocytic	37	4.9	1	1.7
Lymphomatous	15	2.0	2	3.3
Melanocytic	48	6.3	5	8.3
Mesenchymal	149	19.7	4	6.7
Vascular	75	9.9	6	10.0

Table 3. Frequency table of inflammatory disease patterns

Type of Inflammatory	Frequency (n=975)	Percentage
Spongiotic	376	38.6
Lichenoid	288	29.5
Psoriasiform	148	15.2
Vesiculobullous	59	6.1
Granulomatous	54	5.5
Vasculopathic	28	2.9
Panniculitis	20	2.1

Table 4. Definitive Clinicopathologic correlation distribution of different classes of lesions.

Classification	Sub-classification	Histology	Frequency of CPC	Percentage
Neoplastic (n=649)			**421**	**64.8**
	Benign (n=601)		**392**	**65.2**
		Neural (n=15)	8	53.3
		Adnexal (n=198)	125	63.1
		Cyst (n=136)	98	72.1
		Lipoma (n=58)	49	84.5
		Fibroblast (n=4)	2	50.0
		Epidermal (n=141)	97	68.8
		Histiocytic (n=28)	12	42.8
		Lymphomatous (n=13)	8	61.5
		Melanocytic (n=82)	53	64.4
		Mesenchymal (n=114)	91	79.8
		Vascular (n=54)	34	63.0
	Malignant (n=48)		**29**	**60.4**
		Neural (n=1)	1	100
		Adnexal (n=2)	1	50.0
		Epidermal (n=31)	19	61.3
		Lymphomatous (n=1)	0	0.0
		Melanocytic (n=3)	2	66.7
		Mesenchymal (n=4)	2	50.0
		Vascular (n=6)	4	66.7
Inflammatory (n=872)			**580**	**66.5**
		Granulomatous (n=52)	37	71.1
		Lichenoid (n=257)	200	77.8
		Spongiotic (n=334)	187	56.0
		Vesiculobullous (n=53)	30	56.6
		Vasculopathic (n=20)	11	55.0
		Psoriasiform (n=136)	107	78.7
		Panniculitis (n=18)	10	55.6
Infections (n=151)			**107**	**70.8**
	Viral (n=135)		93	68.9
	Parasitic (n=6)		4	66.7
	Mycobacterial (n=6)		6	100.0
	Fungal (n=5)		4	80.0
Dermal deposits (n=10)			**5**	**50.0**
		Amyloidosis (n=1)	1	100.0
		Calcium (n=5)	2	40.0
		Mucin (n=2)	1	50.0
		Onchronosis (n=1)	1	100
Miscellaneous (n=67)			44	65.66

Table 5. Definitive Clinicopathologic correlation distribution of Alopecias and scalp disorders

Classification	Sub-classification	Histology	Frequency of CPC	Percentage
Alopecia and scalp (n=90)			**77**	**85.5**
	Alopecias (n=62)		56	90.3
		Central centrifugal cicatricial alopecia (n=21)	18	
		Alopecia areata (n=20)	19	
		Lupus (n=13)	13	
		Androgenetic alopecia(n=6)	4	
		Traction alopecia(n=2)	2	
	Scalp disorder (n=28)		17	60.7
		Folliculitis decalvans (n=24)	15	62.5
		Acne kelodalis nuchae (n=2)	1	50.0
		Dissecting cellulitis (n=2)	1	50.0