Brief Report

Clinico-Pathological Correlation in Dermatological Disorders: A Retrospective Audit of 332 Skin Biopsies from a Tertiary Care Center

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Abstract

Background: Skin biopsy is a frequently employed tool by the dermatologists with several factors that are known to influence its diagnostic yield as well as interpretation. The objective of our study was to analyze the clinico-pathological concordance and discordance rates in various dermatological conditions and study the factors affecting the same. **Materials and Methods:** We retrospectively analyzed 332 biopsies conducted over a period of 1 year and looked for clinico-pathological correlation and tabulated the results. **Results:** The overall concordance rate observed in the present study was 70.48% (234 out of 332). Out of 234 concordant cases, 175 of them (74.8%) were concordant with the first differential diagnosis mentioned on the histopathology requisition form, thus revealing an acceptable level of clinico-pathological correlation. The concordance was observed to be 66.87% when only one differential was mentioned on the requisition forms, whereas it increased to 73.96% when more than one diagnosis was offered (P = <0.00001). However, the adequacy of clinical description on the histopathological requisition form was not observed to significantly impact the clinico-pathological correlation in the present study. **Conclusion:** An acceptable level of clinico-pathological concordance was observed in the present study thus reinforcing skin biopsy as an indispensable tool in the dermatological practice. However, continuous effort in the form of regular audits in the department, interdepartmental discussions between pathologists and clinicians, and repeat biopsies in case of discordancy would help in identifying and addressing the deficiencies that impact the diagnostic yield of histopathology and which would ultimately result in better patient care.

Keywords: *Concordance, dermatopathology, discordance, histopathology, skin biopsy*

Introduction

Dermatology unlike other specialties relies on very few investigations to confirm the diagnosis, of which skin biopsy plays a major role.[1] Skin biopsy is a well-established tool that helps in diagnosing as well as prognosticating the disease.[2] Thus, increasing the diagnostic yield of skin biopsy is of utmost importance. The correlation between the clinical and pathological diagnosis ranges from 67 to 87% as reported by various studies, thus suggesting that it is influenced by various factors including the definition of concordance and availability of clinical data to the pathologist.[3] The aim of the present study was to evaluate the clinico-pathological concordance and discordance rates among different groups of dermatological disorders and to assess the various factors influencing them.

Materials and Methods

The present study was a hospital-based retrospective study compiling data from all the patients who underwent skin biopsies between March 2018 and March 2019. The study was conducted after obtaining approval from the Institutional Ethics Committee (IEC-539/2019). The data comprised the patient demographics, their clinical details, and a provisional clinical and histopathological diagnosis. These data were obtained from the biopsy registry maintained in the department entered by the treating dermatologists. We assessed the clinical and histopathological concordance and discordance by dividing them into three broad groups.

1. Group 1—Clinical diagnosis consistent with pathological diagnosis
   The clinico-pathological consistency could be either definitive or descriptive.

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It was considered definitely concordant when a definite diagnosis offered by the pathologist matched with one of the differential diagnoses offered by the dermatologist. However, it was considered descriptive, when the pathologist stated just the histopathological findings observed which matched with the histopathological picture of one of the differentials listed by the dermatologist.

2. Group 2—Clinical diagnosis inconsistent with pathological diagnosis
   The clinico-pathological discordancy was further sub-divided into two groups. It was regarded as definitely discordant when the pathologist offered a definite diagnosis that did not match with any of the clinical differentials listed by the dermatologist. Additionally, descriptively discordant comprised of the reports wherein the pathologist stated just the histopathological findings which did not correlate with the histopathological picture of any clinical diagnosis listed by the dermatologist.
3. Group 3—Inadequate sample
   The cases wherein the pathologist was unable to offer either a definite or a descriptive report due to inadequacy of biopsy sample were considered under this group.

All skin disorders were grouped under inflammatory, infectious, tumors, vascular, pigmentary, sclerosing conditions, sexually transmitted infections, disorders of appendages, adverse cutaneous drug reactions, disorders of keratinization, cutaneous deposits, and perforating disorders. The concordance and discordance rates were calculated in the different groups of disorders. The clinical differential diagnosis is usually listed on the histopathology requisition forms in the decreasing order of probability. Hence, in those cases wherein there was clinical and histopathological correlation, the position of the clinical diagnosis in the list of probability on the requisition form was made note of. The other factors such as the repeat biopsies, the site of biopsy, and their relationship with concordance as well as discordance were analyzed. All the data thus collected using Microsoft Excel were analyzed using IBM Statistical Package for Social Sciences 23.0 for Windows. All categorical and quantitative variables were presented as frequencies and percentages and were compared by the Chi-squared test for trend. All statistical analysis was carried out for two-tailed significance, and $P < 0.05$ was considered significant.

Results

A total of 332 skin biopsies conducted between March 2018 and March 2019 were included in this study. The maximum and minimum age biopsied was 86 years and 3 years, respectively, with a mean age of 39.81 ± 18.433 years. The most common age group biopsied was 30–39 years. There were a total of 187 males and 145 females giving a male to female ratio of 1.3:1. The most common site biopsied was the lower limb (n = 100) and the least common was the face (n = 19). Inflammatory disorders were the most common group of disorders that were biopsied (n = 197) and perforating disorders and disorders of cutaneous deposits were the least common group to be biopsied (n = 3).

There were a total of 234 cases under Group 1 thus giving an overall concordance rate of 70.48%. Out of these 234 biopsies, 196 were definitively concordant and the remaining 38 were descriptively concordant. A total of 88 cases fell under Group 2 giving an overall discordance rate of 26.5%, out of which 70 biopsies were definitively discordant and 18 descriptively discordant. There were a total of 10 cases that belonged to Group 3. Table 1 illustrates the various group of disorders with their concordance and discordance rates. Overall, perforating disorders and disorders of cutaneous deposits (100% each) followed by pigmentary disorders were observed to have the highest concordance rates (92.3%), whereas the disorders of appendages had the least concordance rates (0%) thus emphasizing the importance of taking a biopsy from an early representative lesion. However, inflammatory disorders accounted for most of the cases biopsied under which neutrophilic dermatoses (100%) followed by psoriasis/psoriasiform disorders (94.6%) showed the highest concordance rates. On the other hand, vesiculobullous disorders exhibited the highest discordance rates (53.8%) under the inflammatory disorders, thus emphasizing the importance of taking a biopsy from a fresh intact blister and highlighting immunofluorescence as the investigation of choice in these group of conditions which fares far better than a histopathological examination.

Clinically, the average number of differential diagnoses offered by the dermatologist was found to be 1.76. The concordance was observed to be 66.87% when only one differential was mentioned on the requisition forms, whereas it increased to 73.96% when more than one diagnosis was offered (P= <0.00001). Out of 234 concordant cases, 175 were concordant with the first differential diagnosis mentioned on the histopathological requisition form in the order of decreasing probability indicating that an acceptable level of clinico-pathological correlation was obtained in most of the cases. The concordance rates were found to reduce as we moved along this grade of decreasing probability as indicated in Table 2.

A total of 298 out of 332 cases had clinical findings such as history and examination findings mentioned on the histopathology requisition forms and 212 of them showed concordance thus amounting to 71.14%. However, the concordance was 64.7% (22 out of 34) in those where the clinical description was not mentioned (P value = 0.4354), thus showing that though clinical description is a vital detail, it does not significantly affect the histopathology reporting

Table 1: Frequency of distribution of dermatological disorders along with their clinico-pathological correlation

Dermatological disorder	Concordant (Group 1) *n*=234 (70.48%)		Discordant (Group 2) *n*=88 (26.5%)		Inadequate (Group 3) *n*=10 (3%)	Total biopsy *n*=332
	Definite pathological diagnosis compatible with clinical diagnosis *n*=196 (59.03%)	Descriptive pathological diagnosis compatible with clinical diagnosis *n*=38 (11.44%)	Definite pathological diagnosis incompatible with clinical diagnosis *n*=70 (21.08%)	Descriptive pathological diagnosis incompatible with clinical diagnosis *n*=18 (5.42%)		
Inflammatory	133 (67.51%)	17 (8.63%)	37 (18.78%)	7 (3.55%)	3 (1.52%)	197 (100%)
Psoriasis/psoriasiform	31 (83.8%)	4 (10.8%)	2 (5.4%)	-	-	37 (100%)
Lichen planus/Lichenoid	24 (61.5%)	-	12 (30.8%)	2 (5.1%)	1 (2.6%)	39 (100%)
Spongiotic disorders	54 (74%)	6 (8.2%)	10 (13.7%)	3 (4.1%)	-	73 (100%)
Neutrophilic dermatoses	2 (50%)	2 (50%)	-	-	-	4 (100%)
Vesiculobullous	3 (23.1%)	1 (7.7%)	5 (38.5%)	2 (15.4%)	2 (15.4%)	13 (100%)
Miscellaneous inflammatory	9 (81.8%)	1 (9.1%)	1 (9.1%)	-	-	11 (100%)
Non-infective granuloma	4 (57.1%)	2 (28.6%)	1 (14.3%)	-	-	7 (100%)
Panniculitis	3 (42.3%)	1 (14.3%)	3 (42.3%)	-	-	7 (100%)
Connective tissue disorders	3 (50%)	-	3 (50%)	-	-	6 (100%)
Infections	9 (25.7%)	7 (20%)	14 (40%)	3 (8.6%)	2 (5.7%)	35 (100%)
Tumor	12 (40%)	7 (23.3%)	6 (20%)	3 (10%)	2 (6.7%)	30 (100%)
Vascular	12 (50%)	2 (8.3%)	9 (37.5%)	1 (4.2%)	-	24 (100%)
Pigmentary disorders	9 (69.2%)	3 (23%)	-	-	1 (7.7%)	13 (100%)
Sclerosing conditions	6 (75%)	-	2 (25%)	-	-	8 (100%)
Sexually transmitted infections	5 (83.3%)	-	-	-	1 (16.7%)	6 (100%)
Disorders of appendages	-	-	1 (20%)	4 (80%)	-	5 (100%)
Adverse cutaneous drug rash	1 (25%)	2 (50%)	1 (25%)	-	-	4 (100%)
Disorders of keratinization	3 (75%)	-	-	-	1 (25%)	4 (100%)
Cutaneous deposits	3 (100%)	-	-	-	-	3 (100%)
Perforating disorders	3 (100%)	-	-	-	-	3 (100%)

Table 2: Concordance between clinical and histopathological diagnosis with respect to the order of clinical differential diagnosis mentioned on the histopathology requisition form

Group	Total biopsy (*n*=332)	Concordant (*n*=234, 70.48%)	First provisional diagnosis (*n*=175, 74.79%)	Second provisional diagnosis (*n*=44, 18.8%)	Third provisional diagnosis (*n*=13, 5.56%)	Fourth provisional diagnosis (*n*=2, 0.85%)
Inflammatory	197	150 (76.14%)	111 (74%)	31 (20.7%)	6 (4%)	2 (1.3%)
Psoriasis/Psoriasiform	37	35 (94.6%)	26 (74.3%)	6 (17.1%)	1 (2.9%)	2 (5.7%)
Lichen planus/Lichenoid	39	24 (61.5%)	17 (70.8%)	6 (25%)	1 (4.7%)	-
Spongiotic disorders	73	60 (82.2%)	43 (71.7%)	15 (25%)	2 (3.3%)	-
Neutrophilic dermatoses	4	4 (100%)	3 (75%)	1 (25%)	-	-
Vesiculobullous	13	4 (30.8%)	4 (100%)	-	-	-
Miscellaneous inflammatory	11	10 (90.9%)	7 (70%)	2 (20%)	1 (10%)	-
Non-infective granuloma	7	6 (85.7%)	4 (66.7%)	1 (16.7%)	1 (16.7%)	-
Panniculitis	7	4 (57.1%)	4 (100%)	-	-	-
Connective tissue disorders	6	3 (50%)	3 (100%)	-	-	-
Infections	35	16 (45.7%)	12 (75%)	2 (12.5%)	2 (12.5%)	-
Tumor	30	19 (63.3%)	15 (79%)	3 (15.8%)	1 (5.3%)	-
Vascular	24	14 (58.3%)	12 (85.7%)	2 (14.3%)	-	-
Pigmentary disorders	13	12 (92.3%)	7 (58.3%)	2 (16.7%)	3 (25%)	-
Sclerosing conditions	8	6 (75%)	5 (83.3%)	1 (16.7%)	-	-
Sexually transmitted infections	6	5 (83.3%)	5 (100%)	-	-	-
Disorders of appendages	5	0 (0%)	-	-	-	-
Adverse cutaneous drug rash	4	3 (75%)	1 (13.3%)	2 (66.7%)	-	-
Disorders of keratinization	4	3 (75%)	2 (66.7%)	-	1 (13.3%)	-
Cutaneous deposits	3	3 (100%)	2 (66.7%)	1 (13.3%)	-	-
Perforating disorders	3	3 (10%)	3 (100%)	-	-	-

in skin biopsies sent by dermatologists as per the present study. Out of 332 cases, the duration of the dermatological condition was cited in only 180 cases with a mean duration being 59.82 days. Table 3 illustrates the various factors influencing the clinico-pathological correlation. There were a total of 50 cases wherein a repeat biopsy was performed due to failure to reach a clinico-pathological correlation previously and 60% of these biopsies turned out to be concordant (n = 30). Additionally, it was noted that a descriptive pathological report changed to a definitive report in 43.3% cases (n = 13).

Discussion

Skin biopsy is an essential and indispensable tool that is frequently employed in the management of skin disorders. Numerous variables are known to impact the clinico-pathological consistency such as the quality of clinical information provided by the dermatologists in the histopathology requisition forms, the representative lesion chosen for biopsy, choice of biopsy technique as well as usage of ancillary tools such as special stains and immunofluorescence wherever deemed necessary.[1,4]

The overall concordance between clinical and pathological diagnoses was 70.48% as observed in our study. This was in agreement with the study by Aslan *et al*.,[1] (n = 3949) with a reported concordance rate of 76.8%. Malik *et al*.[2] (n = 2216) have reported an overall concordance rate of 61.01%, whereas Balasubramanian *et al*.[4] in their audit of 2955 biopsy specimens reported a concordance of 59.8%. Similarly, studies from Saudi Arabia (n = 4268) and Greece have reported an overall concordance of 76 and 68%, respectively.[3,5] The above-mentioned studies including ours analyzed all types of dermatological disorders, whereas the clinico-pathological consistency reported in some of the earlier studies has been conducted in specific disease entities such as neoplasms and pigmentary disorders and is observed to range from 44 to 96.5%.[6-13]

The majority of the cases biopsied were inflammatory disorders under which lichenoid and spongiotic disorders accounted for majority of the cases with perforating disorders and disorders of cutaneous deposits being the least common biopsied group in the present study. This was in accordance with the study by Aslan *et al*.,[1] wherein inflammatory disorders formed a majority. However, this was in contrast to the studies by Balasubramanian *et al*., Malik *et al*., Gupta *et al*., and Raveendra *et al*., who reported infectious disorders particularly Hansen's disease as the commonest disorder biopsied.[2,4,14,15] This discrepancy could be attributed to the clinical judgment on the part of the dermatologist regarding the necessity of biopsy for diagnosis.

We analyzed the clinico-pathological consistency by dividing them into three broad groups using similar definitions as employed by Aslan *et al*. and Malik *et al*.[1,2] Majority of the concordant cases were definitively concordant (59.03%) with the remaining 11.44% being descriptively concordant with Malik *et al*. and Aslan *et al*. reporting the frequencies of definitively and descriptively concordant in accordance with the present study. The definitively discordant cases amounted to 21.08% with 5.42% being descriptively discordant. However, Malik *et al*. and Aslan *et al*. reported 31.54 and 12.9% biopsies, respectively, as definitively discordant with 4.02 and 10.3%, respectively, being descriptively discordant.[1,2] A total of 10 cases (3%) were reported inconclusive similar to the study by Malik *et al*. (3.29%).[2] We observed the highest concordance rates of 72.9 and 72.8% when the biopsies were obtained from the upper limb and trunk, respectively, though it was not found to be statistically significant (P = 0.7955). This was in contrast to the study by Aslan *et al*.,[1] wherein they demonstrated the site of biopsy having no effect on clinico-pathological consistency.

The concordance rates were highest (74.79%) with the first differential diagnosis listed on the histopathology

Table 3: Factors influencing clinico-pathological correlation

Factors influencing	Concordant, *n* (%)	Discordant, *n* (%)	Inadequate, *n* (%)	*P*
1. Clinical description				
Mentioned (*n*=298)	212 (71.14%)	83 (27.85%)	3 (1%)	
Not mentioned (*n*=34)	22 (64.7%)	5 (14.7%)	7 (20.58%)	0.4354
2. Disease localization				
Mentioned (*n*=321)	225 (70.09%)	86 (26.79%)	10 (3.12%)	
Not mentioned (*n*=11)	9 (81.8%)	2 (18.2%)	-	
3. Number of clinical differential diagnosis offered				
One (*n*=163)	109 (66.87%)	46 (28.22%)	8 (4.9%)	
More than one (*n*=169)	125 (73.96%)	42 (24.85%)	2 (1.18%)	<0.00001
4. Duration of disease				
Mentioned (*n*=180)	117 (65%)	63 (35%)	-	
a) Duration of the disease ≤6 months (*n*=63)	38 (60.32%)	25 (39.68%)	-	0.128
b) Duration of the disease more than 6 months (*n*=117)	79 (67.52%)	38 (32.48%)	-	
Not mentioned (*n*=152)	117 (76.97%)	25 (16.45%)	10 (6.58%)	

requisition form indicating that a fairly good correlation was possible between the clinician and pathologist in our study similar to the study by Aslan *et al*.[1] (68.8%). However, we found a statistically significant increase in concordance rates when more than one differential was offered by the clinician. This was in contrast to the study by Balasubramanian *et al*.,[4] wherein it was observed that there was no improvement in diagnostic accuracy with a longer list of clinical differentials. Aslan *et al*.,[1] in their audit of 3949 patients, observed an increased clinico-pathological correlation among those cases, where the adequate clinical description was mentioned in the requisition form. Rajaratnam *et al*.,[16] in their study on inflammatory dermatoses, reported that histopathology could confirm the diagnosis in 55% of cases when the pathologists were blinded to the clinical information, whereas the diagnostic accuracy increased to 78% when the clinical information was provided to the pathologists. Contrary to the above reports, we did not encounter a significant relationship between the concordance rates and adequacy of clinical information similar to the study by Balasubramanian *et al*.[4] The possible reason for this discrepancy could be explained with the help of a study by Wong *et al*.,[17] wherein it was observed that the clinical diagnosis alone provided by dermatologists was more reliable to achieve a clinico-pathological concordance whereas clinical description was more reliable when the biopsy was sent by clinicians other than dermatologists.

In 50 patients, it was repeat biopsies that were sent for histopathological examination wherein 60% of them turned out to be concordant with 43.3% of biopsies that were previously descriptively concordant becoming definitely concordant. In the study by Aslan *et al*.,[1] repeat biopsies were performed in 36 patients and 25% of descriptive diagnoses turned out to be definitive.

Limitations of the study

1. Small sample size
2. Study design being retrospective in nature.

Conclusion

The present study illustrates an acceptable level of concordance rate of 70.48%, thus reinforcing the vital role played by a simple, yet cost-effective diagnostic tool such as histopathology in establishing an accurate diagnosis in most of the dermatological disorders. Regular audits of clinico-pathological consistencies and organizing clinico-pathological meetings in the departments can help to identify the inadequacies, eliminating which in turn would help in achieving better concordance rates.

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Conflicts of interest

There are no conflicts of interest.

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