DIAGNOSTIC SIGNIFICANCE OF CLINICOPATHOLOGICAL CONCORDANCE IN VARIOUS SPECTRUMS OF SKIN DISORDERS

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ABSTRACT

Introduction

Wide spectrums of skin disorders exist in the world. Skin biopsy is a proven method for allying the dermatologist in overcoming the diagnostic dilemmas that occur in consultations. The different level of clinicopathological concordance, either full or partial and discordant study may reflect the agreement between the clinicians and pathologists for diagnosing spectrum of skin disorders.

Objectives

To analyze the histopathological spectrum of skin diseases emphasizing on the diagnostic significance of its clinicopathological concordance.

Methodology

This is a prospective cross sectional hospital based study of skin biopsies obtained in the Department of Pathology, at Birat Medical College and Teaching Hospital from Dec 2016 to Jan 2020. Demographic data, nature of lesions, correlation between clinicopathological concordance and histopathological diagnosis were analyzed using SPSS version 16.

Result

Among 111 skin biopsies, female gender of 19-39 years age groups was predominant. The commonest histopathological diagnosis of skin biopsies was under infectious and bacterial origin category (24.3%) reflecting non-neoplastic nature mostly. The overall clinicopathological concordant was 78.38% (fully concordant 27.93% and partially concordant 50.45%) and discordant 21.62%. Nature of lesions was strongly correlated ($p<0.05$) with age group, while it was weak with gender. However, the relationship was very strong between histopathological diagnosis and clinicopathological concordance ($p<0.05\%$).

Conclusion

Findings suggest that the clinicopathological concordance correlated well in histopathologically diagnosed disease category of skin disorders. This reflects the high diagnostic value of histopathological examinations for diagnosing different spectrum of skin disorders.

KEYWORDS

Clinicopathological concordant, diagnostic dilemmas, discordant, skin disorders.

INTRODUCTION

Skin being the largest organ of the human body, acts as a barrier to the different environmental factors. However, it is involved in a wide spectrum of disorders ranging from inflammatory conditions to neoplastic lesions.[1] Majority of the skin disorders can be diagnosed by history, clinical presentation and biochemical investigations. Among which, around 1.3% of patients attending the dermatology clinic need a skin biopsy.[2] Hence, histopathological examination still remains gold standard for helping the dermatologist in overcoming diagnostic dilemma.[3]

For this, both the clinical and histopathological data correlating each other offers substantial clues in arriving at the accurate diagnosis.[4] Likewise, exact anatomical location, duration and number of the lesions with other related conditions super add the information in confirming the diagnosis.[5] Such clinical information incorporation during evaluation together with clinical knowledge for histopathological examinations is important to achieve accurate and prompt diagnosis. At this point, it becomes even mandatory for complete and orderly communication to exist between the clinician and the pathologist, particularly when the pathology requisition forms are completed. Some of the studies have examined the clinico-pathological concordance or agreement rate for proper diagnosis of numerous skin disorders, despite of critical clinical and histopathological data.[2,3]

The different level of clinicopathological concordance, either full or partial and discordant may reflect the agreement between the clinicians and pathologists for diagnosing spectrum of skin disorders. Hence, such concordance in evaluating the different spectrum of skin lesions seems to have great diagnostic significance. We hypothesized that such kind of clinicopathological concordance or agreement in our institute seems to be strong. Moreover, such study hasnot been carried out locally in our country.

Hence, this study is designed to analyze the histopathological spectrum of skin diseases emphasizing on the diagnostic significance of its clinicopathological concordance.

METHODOLOGY

This is a prospective, hospital based cross-sectional study carried out in the Department of Pathology, Birat Medical College and Teaching Hospital (BMCTH), Morang, Nepal commencing from December 2016 to January 2020, after receiving the institutional permission. This study included all the skin biopsies received in the collection unit of histopathology section of Department of Pathology, BMCTH irrespective of age and gender during the study period.

As per our departmental norms, specimens were fixed in 10% formalin solution. Necessary information related to detailed clinical history and previous biopsies if done any were taken into consideration from the histopathology requisition forms received including the clinical provisional and differential diagnosis. Gross examination of the sample for its size, shape, color and consistency was done. Representative areas or entire tissue of skin biopsies were sectioned and processed in an automated tissue processor for an overnight schedule of 16-18 hours. Paraffin blocks were made, trimmed the tissue sections of 5-7 mm cut and floated in a water bath at 45°C and then taken on albuminized slides. The slides were then examined under a light microscope after hematoxylin and eosin stain. Also, special stain: Periodic acid-Schiff (PAS) and Zeihl-Neelsen (ZN) were used when required.

The diagnostic histopathological spectrum of the skin diseases has been categorized as: infectious: bacterial, viral, fungal origin, eczematous, noninfectious papulosquamous disorder, vesiculobullous disorder, inflammatory disorder, pigment disorder, degenerative disorder, mesenchymal disorder, vasoproliferative disorder, photodermatoses, vasculitis, descriptive reports, benign neoplasm and malignant neoplasm.[6] The main study outcome is clinicopathological concordance, which included three groups as: fully concordant, partially concordant and discordant. Fully concordant has been defined as identical provisional clinical and histopathological diagnosis. Partially concordant has been defined as inclusion of the histopathological diagnosis as one of the clinical diagnosis and the differential diagnosis recorded by the dermatologist. The overall or total concordant has been defined as both combined fully and partially concordant. Discordant has been defined as incompatibility between the histopathological diagnosis and both the provisional clinical diagnosis and the differential diagnosis.[7]

Sample size required for the study was calculated by the following formula:

Sample size (n) = $z^2 \times (pq)/e^2 = 1.96 \times 1.96 \times 0.5(1-0.5)/0.1^2 = 96$

where, z= 1.96 at 95% CI

p= prevalence proportion in target population to have certain character

q= (1-p)

e= allowable error

The minimum sample size calculated was 96. Non-random sampling has been done, so 15% sample was added. Thus, the final sample size taken was 111. The chi-square test is used to test for significant differences in clinicopathological concordance in relation to the different characteristics of the study biopsies and histopathological diagnosis.A p-value <0.05 was considered significant. Data was entered in Microsoft Excel and analyzed in SPSS version 16.

RESULTS

Among one hundred and eleven skin biopsies recruited in our study, female populations were predominant over male with the highest frequency in the second to fourth decade of life. (Table 1).

Table 1: Social demographics of the study biopsies

Age Group (years)	Frequency n (%)
0-18	11 (9.90)
19-39	56 (50.45)
40-59	31 (27.92)
60 and above	13 (11.71)
Gender	**Frequency n (%)**
Male	45 (40.55)
Female	66 (59.45)

The most common histopathological diagnosis of skin biopsies was of bacterial origin (24.3%) under the infectious category and the rare histopathological diagnosis was under mesenchymal, photodermatoses, vasoproliferative and vesiculobullous disorder, each comprising 0.1% respectively. (Table 2)

Table 2: Categorization of skin disease as per histopathological diagnosis

Disease categorization	Frequency n (%)
Benign neoplasm	11 (9.90)
Degenerative disorder	4 (3.60)
Descriptive report	8 (7.20)
Eczematous	4 (3.60)
Infectious: Bacterial	27 (24.32)
Fungal	2 (1.80)
Viral	2 (1.80)
Inflammatory disorder	15 (13.51)
Malignant neoplasm	5 (4.50)
Mesenchymal disorder	1 (0.90)
Noninfectious papulosquamous disorder	20 (18.01)
Photodermatoses	1 (0.90)
Pigment disorder	7 (6.30)
Vasculitis	2 (1.80)
Vasoproliferative disorder	1 (0.90)
Vesiculobullous disorder	1 (0.90)

After evaluating all the recruited skin biopsies, the commonest histopathological nature of diagnosed specimen was of non-neoplastic origin (88.3%). Among all of the study biopsies, clinicopathological concordant (total) was found more than discordant. Of which, the partially concordant (50.5%) outnumbered the full concordant. (Table 3)

Table 3: Distribution of nature and clinicopathological concordance of skin biopsies

Nature of the lesion	Frequency n(%)	Clinicopathological Concordance	Frequency n(%)
Benign	8(7.21)	Fully concordant	31(27.93)
		Partially concordant	56(50.45)
Malignant	5(4.51)	Concordant (Total)	87(78.38)
Non-neoplastic	98(88.28)	Discordant	24(21.62)

The histopathological diagnosis in the study was categorized individually as benign, malignant and non-neoplastic variables for defining the nature of lesions. The correlation between the natures of such diagnosed skin lesions with different age groups revealed strong positive correlation, p-value <0.001. However, there was no significant correlation value between the natures of such lesions with gender involved in the study, p-value 0.151. (Table 4)

Table 4: Cross tabulation between age groups, gender and nature of skin biopsies (using Pearson's chi-square tests)

Nature of lesion	Age groups (years)				p-value	Gender		p-value
	0-18	19-39	40-59	60-above		Male n(%)	Female n(%)	
Benign n(%)	0(0)	5(8.90)	1(3.20)	2(15.40)	**0.008***	4(8.90)	4(6.10)	0.151
Malignant n(%)	0(0)	0(0)	2(6.50)	3(23.10)		0(0)	5(7.60)	
Non-neoplastic n(%)	11(100)	51(91.10)	28(90.30)	8(61.50)		41(91.10)	57(86.40)	
Total	11(100)	56(100)	31(100)	13(100)		45(100)	66(100)	

*the test result is significant at p<0.05

The correlation between the categorization of histopathological diagnosis and clinicopathological concordance revealed strong positive correlation, p-value <0.05. Among the different histopathological diagnoses, the infectious disease of bacterial origin 27(100%) and the descriptive report 8(100%) category were highest among the total concordant and discordant respectively. (Table 5)

Table 5: Cross tabulation between categorization of histopathological diagnosis and clinicopathological concordance of skin biopsies (using Pearson's chi-square tests)

Categorization of histopathological diagnosis	Concordance		Total n(%)	p-value
	Total Concordant (fully and partially) n(%)	Discordant n(%)		
Benign neoplasm	8(72.73)	3(27.27)	11(100)	**0.001***
Degenerative disorder	4(100)	0(0)	4(100)	
Descriptive report	0(0)	8(100)	8(100)	
Eczematous	3(75)	1(25)	4(100)	
Infectious: Bacterial	27(100)	0(0)	27(100)	
Infectious: Fungal	1(50)	1(50)	2(100)	
Infectious: Viral	1(50)	1(50)	2(100)	
Inflammatory disorder	11(73.3)	4(26.7)	15(100)	
Malignant neoplasm	3(60)	2(40)	5(100)	
Mesenchymal disorder	0(0)	1(00)`	1(100)	
Noninfectious papulosquamous disorder	19(95)	1(5)	20(100)	
Photodermatoses	1(100)	0(0)	1(100)	
Pigment disorder	7(100)	0(0)	7(100)	
Vasculitis	2(100)	0(0)	2(100)	
Vasoproliferative disorder	0(0)	1(100)	1(100)	
Vesiculobullous disorders	0(0)	1(100)	1(100)	
Total	**87(78.37)**	**24(21.63)**	**111(100)**	

*the test result is significant at p<0.05

DISCUSSION

The skin disorders are heterogeneous with a wide clinical and histopathological spectrum. These lesions are common in both males and females.[8] In our study of 111 skin biopsies, female patients outnumbered male patients, as females were 66 and male 45 in numbers. The most common age group was between 19-39 years followed by 40-59 years respectively. The least number of biopsy was seen among the pediatric and early adolescent age group (0-18 years). Though biopsy is important for diagnosis of dermatological diseases in pediatric age group, but its difficult to have biopsy done in such pediatric age group patients incomparison to adults. So, there were few biopsies received of pediatric age group in this study. This findings was different when compared with the study conducted by Gupta P et al[6], Mamatha K et al[9] and Grover et al.[10] The findings in the study of Gupta P et al[6] showed the male patients being out numbered females in their 253 skin biopsies. The most common age group was between 31-40 years and the least affected was between 0-10 years. In Mamatha K et al[9] study, a total of 286 cases were included, out of which 136 cases were male and 150 were female, but the maximum number of cases belonged to 51-60 years of age. Likewise, Grover et al[11] also yielded the predominance of male gender within the 11-20 years of age group in their study.

All of the skin biopsies diagnosed by histopathological examination in our study has been categorized under as: benign neoplasm, degenerative disorder, descriptive report, eczematous, infectious: of bacterial, fungal and viral origin, inflammatory disorder, malignant neoplasm, mesenchymal disorder, non infectious papulosquamous disorder, photodermatoses, pigment disorder, vasculitis, vasoproliferative disorder and vesiculobullous disorder. Among which, the highest frequency was seen for infectious category of bacterial origin 27(24.3%), followed by noninfectious papulosquamous disorder 20(18%) and inflammatory disorder 15(13.5%) respectively. Likewise, mesenchymal disorder, photodermatoses, vasoproliferative and vesiculobullous disorder resulted among the least number, each of 1(0.9%) cases respectively (Table 2). Within the infectious category of bacterial origin, the leprosy was the most common lesion. We used special stain: Ziehl-Neelsen (ZN) to demonstrate the organism. In the study conducted by Gupta P et al[6], the broad spectrum of histopathological diagnosis was almost similar to our study result revealing the infectious disorders of bacterial origin being the most common one. Likewise, in the study conducted by Al-Saif FM et al[7] the most common histopathological diagnosis was under papulosquamous and eczematous dermatoses followed by benign neoplasm, pigmentary diseases and others respectively. Unlike in our study, the infectious diseases category in theirs study was not under the most common category.

The skin disorders in our study are categorized under different histopathological diagnosis. Such diseases are further distributed per their nature revealing the predominant lesion as non-neoplastic of 98(88.3%) cases followed by benign of 8 (7.2%) and malignant 5(4.5%) cases in nature respectively (Table 3). We had a strong correlation, p-value <0.05 comparing between the nature of such histopathologically diagnosed lesions and related age groups. However, there was no significant correlation yield between the natures of such histopathologically diagnosed lesions with the gender involved in the study (Table 4).Some of the study has been observed performing to assess the diagnostic accuracy of certain skin diseases for comparing the clinical to the histopathological diagnosis. One of these studies found 3034(76.8%) biopsies of pathological diagnosis to be consistent with the clinical diagnosis, and inconsistent in 915(23.3%) biopsies report.[11] The clinicopathological consistency was higher in patients with adequate clinical descriptive information in all skin disorders included in their study. Likewise, in a study of 371 cases conducted by Sa DK et al[2] revealed 250(67.4%) cases of histopathological diagnosis consistent with provisional diagnosis, 71(19.1%) cases were corroborative with one of the differential diagnosis and 50(13.5%) cases were inconsistent with the clinical diagnosis provided.

Our study revealed the clinicopathological concordance frequency more for total concordant as 87(78.38%) cases and only 24(21.6%) cases being discordant. Among the total concordant cases, fully and partially concordant cases were 31(27.93%) and 56(50.45%) respectively. This high yielding rate of total clinicopathological concordant and minimum discordant cases in our study reflects the detailed clinical information shared, well representative adequate biopsy received and accurate histopathological diagnosis yield. Some of the studies reflects that the diagnostic accuracy for such biopsy depends upon numbers of factors like as choice of lesion, choice of biopsy site, technique of biopsy, properment of history and clinical diagnosis in biopsy requisition form, proper tissue fixation with staining and adequate coordination between dermatologist and pathologist.[12-14] Likewise, a study conducted by Bin Yap et al found 92% clinicopathological consistency. This high success rate was explained as being attributed to close cooperation between the dermatologist and pathologist. [14]

The clinicopathological concordance result of our study is generally comparable with similar kinds of studies revealing the concordance ranged between 67% and 87%.[2,3,11,15] Likewise, studies from Turkey[11] and Greece[3] showed that the pathological diagnoses were concordant with clinical diagnosis in 76.8% and 68% of the cases respectively. Moreover, a review of 371-skin biopsies study in India resulted in 67.4%, 19.1% and 13.5% cases as full concordant, partial concordant and discordant respectively.[2] Similarly, a large sample study (4268 skin biopsies) evaluation in Saudi Arabia showed 28.3% cases as fully concordant, 47.6% partially concordant and 24.1% as discordant, which seems alike with our study outcomes and findings.[7] In addition, our study revealed a strong correlation, p-value <0.05 yield between the categorization of histopathological diagnosis and its clinicopathological concordance (Table 5). This proves that the relation between clinician as dermatologist and pathologist along with the several other factors like knowledge about precise site from where biopsy is to be done, proper timing, correct techniques, storage and transportation medium also affects the rate of clinicopathological concordance. One of the studies showed the diagnostic yield of clinician as non-dermatologists between 34% to 45% (more discordant rate) and that of the

clinician as dermatologists being high as 71% to 75% (less discordant rate).[15] Therefore declining such discordant rate dependupon the minimization of factors as inappropriate choice of the lesion, poorly executed biopsies techniques, irrelevant clinical diagnosis with insufficient clinical information, faultytissue fixation with processing and inappropriate staining methods.[16-18]

These findings thus add up the importance of histopathological perspective to be both helpful and reliable in the majority of cases in our study with adequate cooperation between the dermatologist and dermatopathologist.

CONCLUSION

Our findings reveal positive correlation between the histopathological diagnosis and its clinicopathological concordance among various skin lesions, majority being total concordant. Non-neoplastic nature of the skin lesions was seen predominantly and bacterial origin of infectious type was highest among histopathological disease category. Strong positive correlation was observed between natures of histopathologically diagnosed skin lesions and the patient's age group but weak correlation existed with gender. This study thus reflects the clinicians to enlighten the accurate diagnosis of skin diseases that would likely benefit from biopsy requests.

RECOMMENDATIONS

A larger sample size may yield more precise and accurate information on clinicopathological concordance in diagnosis of various skin disorders.

LIMITATIONS OF THE STUDY

Our study would have been more informative if we had observed the individual histopathologically diagnosed disease correlation for the clinicopathological concordance including the relation to different sites of biopsy and biopsy techniques.

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CONFLICT OF INTEREST

None

FINANCIAL DISCLOSURE

None

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