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HISTOLOGICAL SPECTRUM AND CLINICOPATHOLOGICAL CHARACTERISTICS OF BREAST PHYLLODES TUMOURS: A SINGLE-CENTRE STUDY

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Abstract

Objective: *To determine the distribution of benign, borderline and malignant phyllodes tumours and to compare patient age and tumour size across the three histological categories.*

Study Design: *Descriptive cross-sectional study.*

Place and Duration of the Study: *Department of Histopathology, Chughtai Institute of Pathology, Lahore, Pakistan, from May to October 2024*

Methodology: *A total of 186 phyllodes tumours with available patient age, gross tumour size and final histological category were analysed. The diagnosis of the final histopathology report was used to classify the cases as benign, borderline or malignant. Frequencies and percentages were calculated for categorical variables. The age and tumour size were summarized as mean ± SD, median, IQR, and range. Distributions were compared between the three groups using the Kruskal–Wallis test and were considered statistically different at $p < 0.05$.*

Results: *Of 186 tumours, 93 (50.0%) were benign, 51 (27.4%) borderline and 42 (22.6%) malignant. Mean patient age was 39.75 ± 12.16 years and mean tumour size was 12.91 ± 7.46 cm. Mean ages were 36.33 ± 10.95, 44.00 ± 13.45 and 42.14 ± 11.11 years in benign, borderline and malignant tumours, respectively ($H=13.42$, $p=0.0012$). Mean tumour sizes were 7.78 ± 3.38, 14.87 ± 3.80 and 21.86 ± 7.84 cm, respectively ($H=111.94$, $p<0.001$).*

Conclusion: *Half of the cases in the study were benign phyllodes tumours. There was a significant difference in age between the histological categories but there was a significant increase in size of the tumours from benign to borderline and malignant. Clinicopathological evaluation can be aided by age and size, but should not be used in lieu of histological grading.*

INTRODUCTION

Phyllodes tumours are rare biphasic fibroepithelial tumours of the breast, made up of a neoplastic stromal component and a non-neoplastic epithelial component. The World Health Organization (WHO) classification (2026) changed the definition of malignancy by allowing at least four of the five adverse stromal criteria, but not all five, and by stressing adequate sampling and careful documentation of the features supporting grade.[1]

Even with the defined criteria, there is interobserver variability and intratumoural heterogeneity, which continues to make classification difficult, especially at the benign–borderline and borderline–malignant margins.[2,3] Local clinicopathological data are also important, as demonstrated by a Pakistani series of 146 cases that showed differences in grade distribution, patient age and tumour size.[4] Other studies, both multicentre and single-institution, in other settings have also shown differences in grade distribution, patient age and tumour size.[5-7]

The aim of the present study was to outline the histological spectrum of phyllodes tumours diagnosed at a single pathology centre and to compare the age of the patient and gross tumour size between the different categories of the tumours (benign, borderline and malignant).

METHODOLOGY

This descriptive cross sectional study was conducted in the Department of Histopathology, Chughtai Institute of Pathology, Lahore, Pakistan, from May to October 2024 The sampling technique was Non-probability consecutive sampling . The analytical dataset contained 186 phyllodes tumour cases with complete entries for patient age, gross tumour size and one final histological category. Cases diagnosed as benign, borderline or malignant phyllodes tumour in excision or mastectomy specimens were eligible. Fibroadenomas, non-phyllodes lesions and specimens considered inadequate for classification were excluded.

Patient age was recorded in years and maximum gross tumour dimension in centimetres. Histological category was analysed as recorded in the final pathology report. The available dataset did not establish uniform slide re-review or regrading of all cases according to the 2026 WHO criteria; therefore, no such reclassification was assumed. Representative photomicrographs supplied with the manuscript were retained for illustration. Because complete case-wise data for stromal cellularity, atypia, mitotic count, stromal overgrowth, margin pattern and follow-up were not available in the analytical dataset, these features were not used for additional statistical modelling.

Data were analysed using Python with SciPy. Categorical variables were expressed as frequency and percentage. Continuous variables were summarised as mean ± standard deviation, median, interquartile range and range. The Kruskal–Wallis test, with correction for ties, was used to compare age and tumour size across the three histological categories. A two-sided p-value <0.05 was considered statistically significant. The reported p-values represent overall three-group comparisons; no post-hoc pairwise testing or multivariable analysis was performed.

Ethical approval for the study was obtained from the Institutional Review Board / Ethical Review Committee of Chughtai Institute of Pathology, Lahore, Pakistan**.** Patient identifiers were not included in the analytical dataset.

RESULTS

The age, tumour size and histological category were recorded for all 186 cases. The benign phyllodes tumours were 93 (50.0%), the borderline were 51 (27.4%) and the malignant were 42 (22.6%). The overall mean age was 39.75 ± 12.16 years (median 39.5; range 16–75 years), while the overall mean tumour size was 12.91 ± 7.46 cm (median 10; range 5–39 cm).

There was a significant difference between the three categories ($H=13.42$, $df=2$, $p=0.0012$). Mean age was 36.33 ± 10.95 years in benign, 44.00 ± 13.45 years in borderline and 42.14 ± 11.11 years in malignant tumours. Thus, the age pattern was not monotonic across grade; the borderline group had the highest mean age. There was a greater gradient for tumour size. Mean size increased from 7.78 ± 3.38 cm in benign tumours to 14.87 ± 3.80 cm in borderline tumours and 21.86 ± 7.84 cm in malignant tumours ($H=111.94$, $df=2$, $p<0.001$; Table I).

Table I: Distribution, age and tumour size according to histological category.

Parameter	Benign (n=93)	Borderline (n=51)	Malignant (n=42)	p-value
Cases, n (%)	93 (50.0)	51 (27.4)	42 (22.6)	—
Age, mean ± SD (years)	36.33 ± 10.95	44.00 ± 13.45	42.14 ± 11.11	0.0012
Age, median (Q1–Q3)	36 (30–42)	43 (34.5–50)	40.5 (35–49.75)	
Age, range (years)	16–70	18–75	20–70	
Tumour size, mean ± SD (cm)	7.78 ± 3.38	14.87 ± 3.80	21.86 ± 7.84	<0.001
Tumour size, median (Q1–Q3)	7 (5–10)	15 (12–15.25)	25 (15–25.75)	
Tumour size, range (cm)	5–20	10–25	5–39	

SD, standard deviation; Q1–Q3, 25th–75th percentiles. P-values are overall Kruskal–Wallis comparisons.

The largest age group was 30–39 years, comprising 63 (33.9%) cases, followed by 40–49 years with 54 (29.0%). Thirty patients (16.1%) were younger than 30 years, 22 (11.8%) were aged 50–59 years and 17 (9.1%) were aged 60 years or older. Sixty-seven (36.0%) tumours measured 5 to <10 cm, with 28 benign, 51 borderline and 40 malignant; and 119 (64.0%) tumours measured ≥10 cm, with 28 benign, 51 borderline and 40 malignant.
(Table II). Representative photomicrographs are shown in Figure 1.

Table II: Age and tumour-size distribution by histological category.

Variable	Benign n (%)	Borderline n (%)	Malignant n (%)	Total n (%)
Age <30 years	21 (22.6)	6 (11.8)	3 (7.1)	30 (16.1)
Age 30–39 years	36 (38.7)	12 (23.5)	15 (35.7)	63 (33.9)
Age 40–49 years	26 (28.0)	15 (29.4)	13 (31.0)	54 (29.0)
Age 50–59 years	7 (7.5)	9 (17.6)	6 (14.3)	22 (11.8)
Age ≥60 years	3 (3.2)	9 (17.6)	5 (11.9)	17 (9.1)
Tumour size 5 to <10 cm	65 (69.9)	0 (0.0)	2 (4.8)	67 (36.0)
Tumour size ≥10 cm	28 (30.1)	51 (100.0)	40 (95.2)	119 (64.0)

Percentages in histological-category columns are within-column percentages. Categories are descriptive; no categorical hypothesis test was performed.

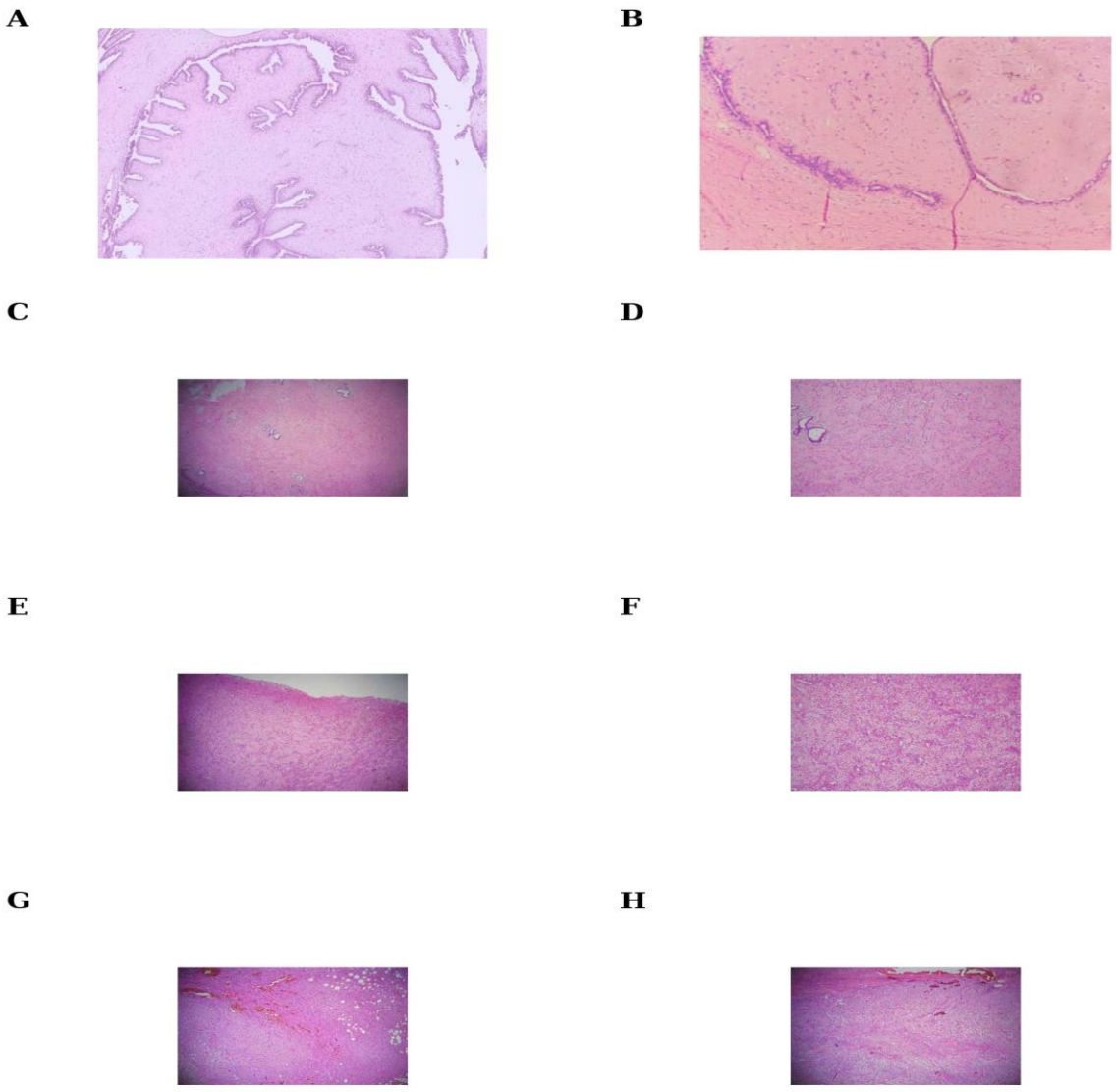

Figure 1: Representative photomicrographs of breast phyllodes tumours from the supplied manuscript: (A–B) benign phyllodes tumour; (C–D) borderline phyllodes tumour; (E–F) malignant phyllodes tumour with heterologous differentiation; and (G–H) malignant phyllodes tumour. H&E stain.

DISCUSSION

This single-centre series showed that benign phyllodes tumours represented the largest group (50.0% of 186 cases), followed by borderline (27.4%) and malignant (22.6%) tumours. The two main clinicopathological differences between the histological categories were age of patients and size of the tumours. The age relationship was not linear, while the tumour size was linear and was clearly stepwise increasing from benign to borderline and malignant.

The observed grade distribution falls within the wide range of variation reported in institutional series, but is affected by referral patterns, specimen selection, sampling and grading practice. The high number of malignant tumours in the multicentre series reported by Co et al. (59.9%) and Hasdemir et al. (40.3%)4,5

compared with the malignant rate in our series (13.6%) further highlights the importance of having clear diagnostic criteria and representative sampling of the tumour rather than relying on institution-specific proportions.

The mean age in the present study was 39.75 years. The mean age of occurrence of benign tumours was lower than that of the borderline and malignant tumours, but the mean age of the borderline was the highest. This aligns with the opinion that age can give context to the clinical picture, but is not a grading criterion. The important omnibus Kruskal-Wallis result indicates that there is some difference between the age distributions, but this should not be interpreted as evidence that each pair of grades differs from the other.

The size of the tumour was the most descriptive gradient. The mean size of the benign tumours was 7.78 cm, that of the borderline tumours was 14.87 cm and that of the malignant tumours was 21.86 cm. In other clinicopathological studies such as the Pakistani series of Hashmi et al. and the multicentre series of Mihai et al[4,7], larger tumours were associated with higher grade; however, there was significant overlap in the present series: benign tumours ranged up to 20 cm while malignant tumours were as small as 5 cm. Size therefore cannot replace microscopic classification. The lack of tumours <5 cm in the data set provided is also unusual and may be due to referral, case selection or data recording features and should be checked against the source data prior to submission.

Current classification focuses on the stromal component and on extensive sampling. The 2026 WHO update has also adopted four of the five adverse histological features in an adequately sampled lesion as a definition for malignant phyllodes tumour, which has been challenged by recent work, and comparative work published in 2026 has also indicated that other classification systems can alter the borderline–malignant boundary without necessarily improving the prognostic discrimination.[16]

These findings are descriptive and not prognostic as recurrence, margins, metastasis, and survival were not available. The photomicrographs show the spectrum but are not intended to be a substitute for systematic case level evaluation of grade variables.[9-14]

This study has a relatively large single centre cohort and complete recorded data for age, tumour size and histological category. There are several important limitations: a verified sampling method and study period were not provided in the manuscript, case identifiers were not provided to ensure independence of records, there was no uniform slide re-review in the current WHO classification, and there was incomplete and unstructured data for key stromal features, margins, treatment and follow up. Where possible in the source material these limitations should be addressed, where they cannot they should be clearly stated.

CONCLUSION

The 186 cases in this single centre series were made up of benign phyllodes tumours (50.0%). The age of the patients varied greatly between the histological categories; the size of the tumour increased significantly from benign to borderline and malignant tumours. These clinicopathological factors can aid in the grading of phyllodes tumours; however, thorough sampling and combined histological analysis is essential for the accurate grading of phyllodes tumours. The individual WHO grading parameters, margin status and follow-up results should be recorded in a standardised way in future institutional studies.

DECLARATIONS

ETHICAL APPROVAL: The present study was conducted in accordance with established ethical standards for research involving human participants. Ethical approval for the study was obtained from the Institutional Review Board / Ethical Review Committee of Chughtai Institute of Pathology, Lahore, Pakistan prior to the commencement of the study

COMPETING INTEREST: The authors declared no conflict of interest.

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AUTHORS' CONTRIBUTION: HK, FK, NMR, ASC and SI contributed to the conception or design of the work, interpretation of data, critical revision of the manuscript for important intellectual content, and approved the final version to be published. All authors agree to be accountable for all aspects of the work.

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