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RESEARCH ARTICLE
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EXPLORING CLINICIANS' PERSPECTIVES ON THE ROLE OF FINE NEEDLE ASPIRATION CYTOLOGY TEST IN DIAGNOSING BODY LUMPS IN D. I. KHAN; A REMOTE AREA OF KP.

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Abstract

Background: Fine Needle Aspiration Cytology (FNAC) is a cost-effective and minimally invasive diagnostic tool for evaluating body lumps. Despite its clinical significance, its utilization and perceived effectiveness may vary in resource-limited areas like Dera Ismail Khan (D. I. Khan), Khyber Pakhtunkhwa, Pakistan.

Objective: To assess clinicians' knowledge, perceptions, utilization patterns, and perceived challenges related to FNAC in diagnosing body lumps in D.I. Khan, a remote healthcare area of KP.

Methods: A descriptive cross-sectional survey was conducted over six months (1st June – 31st December 2024) involving 50 clinicians in D.I. Khan using a non-probability convenience sampling technique. A structured, expert-reviewed, self-administered questionnaire was used to gather demographic data and responses regarding FNAC awareness, usage, and challenges. Data were analyzed using SPSS version 23, applying descriptive and inferential statistics (Chi-square test, $p<0.05$ & Fisher's exact test).

Results: Of the 50 clinicians surveyed, most practiced in urban areas (84%) and were male (76%), with 56% being consultants. While 88% were familiar or very familiar with FNAC, only 44% reported frequent use. FNAC was primarily used for thyroid (28%) and breast lumps (20%), with usage significantly associated with designation ($p=0.025$) and department ($p=0.01$). Most clinicians (80%) considered FNAC effective or very effective. Major advantages included its minimally invasive nature (46%) and cost-effectiveness (8%), whereas key challenges included reliance on trained personnel (46%) and limited resources (30%). Recommended improvements included enhanced training (30%), better infrastructure (16%), and mobile diagnostic units (14%).

Conclusion: Clinicians in D.I. Khan recognize FNAC's diagnostic value but face practical limitations in its routine application. Targeted training, infrastructure upgrades, and mobile diagnostic solutions are essential to improve FNAC utilization and diagnostic capacity in underserved areas.

Keywords: Fine-Needle Aspiration, Body Lumps, Clinician Perception, Rural Health, Cytology, Diagnostic Techniques.

INTRODUCTION:

Fine Needle Aspiration Cytology (FNAC) is widely recognized as a rapid, cost-effective, and minimally invasive diagnostic tool for evaluating body lumps, especially in low-resource settings. It is extensively used in the preliminary diagnosis of palpable swellings involving the breast, thyroid, lymph nodes, salivary glands, and soft tissues. Over the last decade, multiple studies have confirmed its high sensitivity and specificity, making it a valuable first-line investigation in both urban and rural healthcare facilities[1-4].

In Pakistan, particularly in remote regions like Dera Ismail Khan (D.I. Khan) in Khyber Pakhtunkhwa (KPK), healthcare infrastructure remains underdeveloped. In such areas, FNAC plays a critical role in triaging cases, guiding treatment, and reducing the need for more invasive procedures[5,6]. Arshad et al. reported high diagnostic accuracy of FNAC in breast lumps, reinforcing its utility in primary care settings[1]. Similarly, Khan et al. highlighted the importance of FNAC in evaluating neck masses, emphasizing its ability to differentiate benign from malignant lesions effectively[2].

Studies conducted in both urban and rural setups have repeatedly shown FNAC's value across various regions globally. For instance, FNAC has shown high diagnostic efficacy in thyroid swellings[3,10], lymphadenopathy[6,13], soft tissue tumors[4], and pediatric head and neck masses[9]. Its ability to provide a quick and reliable diagnosis allows clinicians to make informed decisions without requiring immediate surgical biopsy, which may be impractical in rural or under-resourced hospitals at times[5,7,8].

Despite its advantages, the literature also indicates variability in clinicians' reliance on FNAC, often influenced by availability of trained cytopathologists, institutional protocols, and diagnostic infrastructure[11,12,14]. In D.I. Khan and similar settings, there is a need to understand clinicians' perspectives regarding the utility, trustworthiness, and practical challenges of FNAC to better integrate it into routine clinical workflows.

Research Question:

What are the perspectives of clinicians practicing in Dera Ismail Khan, a remote area of Khyber Pakhtunkhwa (KPK), regarding the role, utility, and limitations of Fine Needle Aspiration Cytology (FNAC) in diagnosing body lumps?

Research Objective:

To assess knowledge, attitude & practice and collect suggestions of clinicians regarding the diagnostic value and practical utility of FNAC in evaluating body lumps and for improving FNAC services in remote regions like D.I. Khan.

This literature search highlights the broad diagnostic value of FNAC across multiple studies and settings while underlining the relevance of evaluating its perceived role among clinicians practicing in remote regions like D.I. Khan.

Materials and Methods:

Study Design and Setting:

This study employed a descriptive, cross-sectional survey design conducted in Dera Ismail Khan (D.I. Khan), a remote district in Khyber Pakhtunkhwa, Pakistan. The aim was to explore clinicians' perspectives on the use and challenges of Fine Needle Aspiration Cytology (FNAC) in diagnosing body lumps.

Sampling Technique:

A non-probability convenience sampling technique was used, targeting all available clinicians in D.I. Khan who consented and were willing to participate in the study.

Sample Size:

A minimum of 50 clinicians were targeted to ensure adequate representation and meaningful data analysis. The final sample size was adjusted based on participant availability and response rate.

Study Duration:
The study was conducted over a six-month period, from 1st June 2024 to 31st December 2024.

Demographic Variables:
The questionnaire collected demographic information including:
- Gender
- Designation (e.g., Medical Officer, Consultant)
- Years of Clinical Experience
- Primary Place of Practice (Urban or Rural)

Research Variables:
Key variables assessed in the study included:
- Clinicians' knowledge and familiarity with FNAC
- Perceptions regarding the effectiveness of FNAC
- Utilization frequency and diagnostic applications
- Challenges encountered in FNAC practice
- Recommendations for improvement

Data Collection Procedure:
Data were collected using a structured, self-administered questionnaire. The tool was developed and reviewed by subject expert (having minimum 20 years' experience as consultant histopathologist in renowned institutions) to ensure content validity. Survey was paper-based and distributed in person to maximize response rates and ensure clarification when needed.

Data Analysis:
Quantitative data were analyzed using SPSS version 23. Descriptive statistics were used to summarize demographic data and frequency distributions. Inferential statistics (Chi-square test & Fisher's exact test) were applied to identify associations between demographic characteristics and FNAC-related perceptions and practices, with a significance level set at $p < 0.05$.

Results:
Demographic Profile:
A total of 50 clinicians participated in the study. Most were based in urban settings (84%, *n*=42), with 16% (*n*=8) practicing in rural areas as shown in table 1. The majority were male (76%, *n*=38), and the largest proportion were affiliated with the Medicine department (40%, *n*=20), followed by Surgery (24%), Gynecology/Obstetrics and ENT (16% each), and Radiology (4%).
Regarding designation, over half were Consultants (56%, *n*=28), while Residents and General Practitioners comprised 40% (*n*=20) and 4% (*n*=2), respectively. Most participants (62%, *n*=31) had 0–5 years of clinical experience, with smaller proportions distributed across higher experience brackets.

Category	Subgroup	Frequency
Department	Medicine	20 (40%)
	Surgery	12 (24%)
	Gynae & OBS	8 (16%)
	ENT	8 (16%)
	Radiology	2 (4%)
Gender	Male	38 (76%)
	Female	12 (24%)
Primary place of practice	Urban	42 (84%)
	Rural	8 (16%)

Designation	Consultant	28 (56%)
	Resident	20 (40%)
	General practitioner	2 (4%)
Experience(Years)	0-5	31(62%)
	6-10	5(10%)
	11-15	6(12%)
	16-20	1(2%)
	21+	7(14%)

Table 1. Demographic Characteristics of Participants (N=50).

Familiarity and Use of FNAC:

When asked about their familiarity with Fine Needle Aspiration Cytology (FNAC), most clinicians (88%) described themselves as either "very familiar" (56%) or "familiar" (32%) with the procedure. However, this familiarity did not always translate into regular usage. Only 44% (*n*=22) reported using FNAC always or often, while a nearly equal proportion (46%, *n*=23) said they used it only sometimes or rarely. A small group (10%, *n*=5) indicated they never used FNAC in their practice.

FNAC was most commonly used for evaluating thyroid lumps (28%) and breast lumps (20%). A significant number (40%, *n*=20) utilized it in a broader diagnostic context involving a combination of sites such as thyroid, breast, lymph nodes, and soft tissue swellings.

Statistical analysis revealed a meaningful association between FNAC usage and clinicians' designation (p=0.025), as well as their department (p=0.01), suggesting that both professional role and specialty may influence how and when FNAC is employed. The data is shown in table no. 2.

Variable	Response	Frequency (%)	Association (p-value)
Familiarity	Very familiar	28(56%)	
	Familiar	16(32%)	
	Somewhat familiar	6(12%)	
Frequency of Use	Always/often	22(44%)	Designition:0.025
	Sometime/ Rarely	23(46%)	
	Never	5(10%)	
Common Application	Thyroid lumps	14(28%)	Department:0.01
	Breast lumps	10(32%)	
	Mixed/Comprehensive use Breast+ thyroid+ lymph node /soft tissue	20(40%)	

Table 2. FNAC Familiarity and Utilization.

Perceptions of Effectiveness and Challenges:

A large majority of participants (80%, *n*=40) considered FNAC to be either "very effective" (34%) or "effective" (46%) in diagnosing body lumps. When asked about key advantages, 46% cited its minimally invasive nature, while others noted benefits like cost-effectiveness (8%) and quick turnaround times (6%). A substantial portion (40%) highlighted a combination of these features.

Despite this positive perception, many clinicians acknowledged significant challenges. Almost half (46%, *n*=23) viewed the need for trained personnel as a primary barrier. Additionally, 34% pointed to a mix of limitations—including insufficient resources, inconclusive results, and sample inadequacy—as key factors hindering the wider adoption of FNAC as shown in table no.3.

Statistical analysis as shown in Table no. 4, indicated that perceived challenges were significantly associated with clinicians' designations (p=0.01). When it came to suggestions for improvement, 30% emphasized the need for enhanced training programs, followed by calls for better infrastructure (16%), mobile diagnostic services (14%), and integrated strategies (40%) that combine training,

funding, and resource support. These recommendations showed significant variation across different departments (p=0.047).

Variable	Response	Frequency (%)
Effectiveness	Very effective	17(34%)
	Effective	23(46%)
	Somewhat effective	10(20%)
Key advantages	Minimally invasive	23(46%)
	Cost effective	4(8%)
	Quick results	3(6%)
	Combined Advantages i.e. minimally invasive, cost effective and quick results.	20(40%)
Key Limitation	Required skilled personal	23(46%)
	Limited sample size	6(12%)
	Inconclusive results	4(8%)
	Combined Limitations i.e. requiring skilled personal, limited sample size & inconclusive results.	17(34%)

Table 3. Perceived Effectiveness and Advantages.

Variable	Response	Frequency (%)	Association (P-value)
Challenges	Lack of trained personnel	17 (34%)	Designation: 0.01
	Resource limitations	6 (12%)	
	Combined challenges	27 (54%)	
Recommendations	Enhanced training	15 (30%)	Department: 0.047
	Infrastructure improvement	8 (16%)	
	Mobile diagnostic units	7 (14%)	
	Combined strategies	20 (40%)	

Table 4. Challenges and Recommendations.

Discussion:

This survey-based study explored clinicians' perspectives on the use of Fine Needle Aspiration Cytology (FNAC) for diagnosing body lumps in Dera Ismail Khan, a remote area of Khyber Pakhtunkhwa (KP). The findings offer critical insights into FNAC's perceived value, its utilization patterns, and the operational challenges faced in a resource-limited area of KP.

Most clinicians (88%) reported being familiar or very familiar with FNAC, reflecting strong awareness of its diagnostic role. However, familiarity did not consistently translate into high utilization of the test as only 44% reported frequent use (always/often), while 46% used it occasionally or rarely. This gap between knowledge and practice may reflect systemic issues rather than clinical doubts about FNAC itself. Indeed, 80% of respondents perceived FNAC to be effective or very effective, aligning with published evidence supporting its diagnostic accuracy, particularly for palpable breast, thyroid, and lymph node lesions[1,2,4,10,13].

Thyroid (28%) and breast (20%) lumps were the most common conditions for which FNAC was utilized, followed by for other multiple swellings in different parts of the body (32%). This pattern corresponds with existing literature, where FNAC is established as the first-line investigation in thyroid and breast pathology[3,7,10,12]. Notably, utilization varied significantly by both designation and clinical department (p=0.025 and p=0.01, respectively), suggesting that clinical role and specialty influence reliance on FNAC. For instance, internal medicine and surgical specialties are more likely to encounter relevant cases, consistent with findings from Gupta et al. and Sharma et al[4,6].

The survey identified FNAC's minimally invasive nature (46%) and cost-effectiveness (8%) as its main benefits. These strengths are particularly relevant in under-resourced settings like D.I. Khan, where affordability and patient comfort becomes an essential consideration[5,8,13]. However, the most cited limitation—dependence on skilled personnel (46%)— coincides with literature already

highlighted in previous national and regional studies[5,9,11]. A further 30% of respondents noted procedural challenges, including limited equipment, delays, and inconclusive reports, which mirror barriers described by Rahim and Rehman in similar district hospital environments[15].

A lack of trained personnel (34%) and infrastructural limitations (30%) emerged as the most pressing challenge. These limitations not only hinder diagnostic quality but may also shatter clinicians' confidence in relying on FNAC reports. This finding is consistent with the work of Lodhi et al. and Ahmad et al., who emphasized the shortage of cytopathology experts in rural Pakistan[5,8].

To overcome these barriers, clinicians recommended enhanced training (30%), improved infrastructure (16%), and integrated strategies like funding plus mobile diagnostic units (32%). These preferences varied by department ($p=0.047$), reflecting different exposure levels and diagnostic needs. The correlation of challenges with designation ($p=0.01$) also implies that junior clinicians may feel more affected by system-level deficiencies, especially in the absence of specialist support or experience.

Overall, while clinicians in D.I. Khan recognize the diagnostic value of FNAC, its full potential remains underutilized due to systemic limitations rather than clinical uncertainty. Strategic investments in training and infrastructure, particularly in rural areas, could strongly improve the outcomes of this test as supported by several national & international studies[13-15].

Conclusion:

This study highlights that while clinicians in Dera Ismail Khan demonstrate strong familiarity and generally positive perceptions of FNAC, its actual utilization varies significantly due to systemic and operational barriers. FNAC is recognized for its diagnostic accuracy, minimally invasive nature, and cost-effectiveness, particularly in evaluating thyroid and breast lumps. However, reliance on skilled personnel, limited resources, and procedural challenges continue to hinder its optimal use, especially in rural settings.

Differences in usage patterns based on designation and department underscore the need for targeted interventions. Clinicians strongly recommended enhanced training, infrastructure development, and mobile diagnostic services as practical solutions to bridge current gaps. Strengthening these areas could significantly improve FNAC service delivery, enabling timely and accurate diagnosis of body lumps in remote and underserved regions like D.I. Khan.

Recommendations:

Based on the findings of this study, several key recommendations can be made to enhance the use and effectiveness of Fine Needle Aspiration Cytology (FNAC) in diagnosing body lumps in Dera Ismail Khan:

1. **Infrastructure and Resource Improvements**: Expanding access to diagnostic equipment, improving laboratory facilities, and ensuring consistent cytopathology reporting can address many of the barriers identified in this study.
2. **Integrating FNAC into Routine Protocols**: FNAC should be more firmly integrated into the clinical decision-making protocols, especially for conditions like thyroid, lymph node to diagnose infections like Tuberculosis and breast lumps. This may involve encouraging clinicians to adopt FNAC as the first-line diagnostic tool for palpable masses.
3. **Strengthening Multi-disciplinary Collaboration**: Collaborating with pathologists, radiologists, and cytopathologists to ensure better clinical-pathological correlation and faster turnaround times could improve clinician's confidence in FNAC results.

Limitations:

While this study provides valuable insights into clinicians' perceptions of FNAC, several limitations were faced:

1. **Sample Size and Generalizability**: The study sample was limited to 50 clinicians in Dera Ismail Khan. While this provides useful insights into the local context, it may not be fully representative of

clinicians in other parts of KPK or Pakistan. Larger, multi-centric studies could offer a broader understanding of FNAC utilization.

2. **Cross-sectional Design**: The study employed a cross-sectional survey design, which provides a snapshot of clinicians' attitudes and practices at a single point in time. Longitudinal studies are needed to evaluate changes in FNAC utilization and outcomes over time.

3. **Limited Exploration of Barriers**: While the study identified key barriers to FNAC utilization, a deeper qualitative exploration into the specific challenges faced by clinicians—such as institutional policies, patient factors, or personal experiences—could provide more practical recommendations.

Conflict of Interest: The authors declare no conflict of interest.

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