**Abstract**

**Background:** Research and publications are critical to advancements in the quality of healthcare delivery. This article attempts to highlight the prospects and challenges of fine needle aspiration (FNA) cytology as a tool for research in Nigeria. **Materials and Methods:** Data available in local and international bibliographic databases for the period 1986–2005 (20 years) were collated and analyzed. **Results:** The theme of Nigerian FNA-focused studies correlated with the recognized disease patterns in the country which are tuberculous lymphadenitis, breast tumors and Burkitt’s lymphoma. The accuracy of FNA in these situations was high and comparable to the experience in developed countries. It was found that the total number of articles published during two contiguous periods (1986–1995 and 1996–2005) had increased from 5 to 18. Also, in majority of cases, the articles were not published in specialized pathology journals. **Conclusions:** The utilization of FNA is apparently lagging in Nigeria. Given its potential in resource-constrained settings, we are of the opinion that it should be used more often in clinical and translational research. **Key words:** Cytology, Nigeria, research

**INTRODUCTION**

Fine needle aspiration (FNA) cytology is a simple and sensitive alternative to open surgical biopsy.[1,2] Though it is a relatively new technique in many developing countries, including Nigeria, there is a growing body of evidence that it can be easily adapted to address their peculiar healthcare challenges.[3,4] That FNA is yet to reach its full potential in Nigeria may be attributed to the scarcity of skilled manpower and pessimism of the medical community.[5] It is not unusual that during the early phases of its growth, the FNA would face stiff competition from established methods of rapid pathological diagnosis owing to uncertainties about its diagnostic reliability.[6-8] However, the successful conduct of rigorous scientific studies that corroborated cytological diagnoses with clinical, biopsy and follow-up data had decisively established its accuracy and cost effectiveness.[9-11] Much of these pioneering works had since been validated.[12-15] Today, the FNA not only enjoys widespread acceptability in leading medical institutions in the industrialized world but also is flourishing in India, Malaysia, South Africa, and Vietnam among other developing countries.[16-20]

Among other factors, research and publications are known to be critical to advancements in the quality of healthcare. But there seems to be a paucity of data on the use of FNA in clinical and epidemiological research in Nigeria.[21] This study aims to highlight the nature and character of research in this specialty in Nigeria to draw attention to its prospects and challenges, which could prove useful to workers in similar surroundings.
MATERIALS AND METHODS

A search was done for Nigerian research articles under the MeSH terms “fine needle aspiration”, “needle aspiration biopsy”, combined with “Nigeria cytology” which were published from 1986 to 2005 in online databases, the collections of the medical library of the Faculty of Medicine, Bayero University, Kano, Nigeria, and conference proceedings and abstracts. The bibliographies were those indexed in the PubMed, the African Journals Online (AJOL) and the African Index Medicus (AIM). PubMed is a service of the US National Library of Medicine that includes over 20 million citations from MEDLINE and other life science journals for biomedical articles dating back to the 1950s. PubMed includes links to full text articles and other related resources. The AIM, an international index to African health literature and information sources, was established by the World Health Organization in collaboration with the Association for Health Information and Libraries in Africa (AHILA), in order to give access to information published in or related to Africa and to encourage local publishing, while AJOL is a database that provides access to African published research in 402 journals about half which are focused on biomedical research.

Only journals that showed unequivocal evidence of peer-review mechanism were included. A hard copy of each paper (or abstract) was retrieved and critically reviewed by the investigators. Data collated from each article retrieved in the present study included the identity of the institution where the study was done, scope and methodology of the work, and the diagnostic accuracy of the test obtained (if any). Analysis was made using EPI-Info version 6.0 software and the results are presented in the form of simple frequency tables.

RESULTS

The publication years of the articles were from 1986 to 2005. During the period studied, a total of 23 research papers were published dealing with various aspects of FNA, from Nigerian institutions.

Authorship and settings
The distribution of the authors of journal articles in this study showed that 7/23 publications emanated from the Ibadan center alone. Workers based in Zaria and Maiduguri contributed four articles each during the period. There were no international collaborative works in the sample studied. From the available data, the combined efforts of interdisciplinary teams produced 15 articles.

Medium of publication
Our search strategy revealed that out of a total of 18 journals that published articles on FNA during the period of the present study, only 2 were specialized pathology journals. The journals which published articles on FNA included those that belong to the discipline of surgery (3), pediatrics (3), international health (7) and general medicine (4), among others. Overall, 12 of the journals are indexed in the influential MEDLINE database [Table 1]. Two of these journals each carried three articles on FNA in Nigeria. In addition, two articles that appeared in conference proceedings/abstracts were retrieved and included in the study.

Time trends
It was found that the articles published during two contiguous periods (1986–1995 and 1996–2005) increased from 5 to 18 in the later period. In the former period (1986–1995), the articles were published exclusively in international journals (MEDLINE-indexed) as compared to the later period when a few appeared in local journals (30.4%).

Publication type
The frequency distribution of the articles on FNA in various sites is shown in Table 2. The sample consists mainly of “narrative” articles on the basis of extensive case series (15 studies). There were six case reports and one review article. Majority of the works were singular-organ based.
studies that focused on breast diseases (4) and lymph node lesions (3), while the rest had targeted small round cell tumors, thyroid gland, liver, Burkitt’s lymphoma and soft tissue tumors. Only four articles described works that involved diseases of multiple sites/organisms. The authors did not utilize molecular methods (immunocytochemistry, PCR, etc.) in their works.

Diagnostic accuracy
About a third of the articles were case reports which therefore made no reference to sensitivity or specificity of the FNA. A good number also were in the form of literature reviews. Table 3 summarizes the diagnostic accuracy of FNA in various Nigerian studies. The sensitivity rates were particularly high for breast cancer in the quoted studies (ranging from 79 to 96.1%). In the evaluation of tuberculous lymphadenitis, the FNA test showed a high sensitivity up to 98.1%. For thyroid cancer, according to the only available publication, the sensitivity was 83% and the specificity 80%.

DISCUSSION
The first full length article recording the use of FNA in Nigeria appeared in 1986 in the West African Journal of Medicine, documenting the investigative efforts of Bhursnamath et al. who performed FNA on 220 patients with histologic correlation in 71 cases at the ABU Teaching Hospital in Zaria.[25] Lymph nodes were the most commonly aspirated sites for the suspicion of tuberculosis. From the available records, the practice of FNA appeared to have been largely restricted to that institution and the UCH Ibadan until a decade later. The factors that contributed to the slow acceptance of FNA in Nigeria in those early days are multifactorial, and parallel the reasons for underutilization of FNA elsewhere.[15] Prominent among these are anxiety or an initial lack of confidence in its sensitivity and specificity, and also paucity of skilled manpower. Other reasons that had been given included an unfounded fear of tumor implantation in the needle track, apprehension of the law and the reluctance of surgeons to relinquish the use of formal biopsy either due to loss of clinical practice or due to a reduction in surgical earnings.[4]

FNA practice in Nigeria grew rapidly due to the enthusiastic support and progressive interest of a rather small group of pathologists who mostly practiced in academic medical institutions.[25-28] This is in keeping with the opinion of Gupta et al. that the economic milieu at non-academic institutions may actively discourage clinicians from fully utilizing FNA.[12] It is noteworthy that the pioneering studies of those teams amply demonstrated the cost effectiveness and accuracy of FNA in Nigeria, which translated into its increasing popularity and utilization in preoperative diagnosis.

By the year 2005, the FNA experiences of various Nigerian experts in clinical and epidemiological research were captured in articles that covered a diverse range of subjects. To our knowledge, these were published in a total of 18 journals. Available records show that case reports, and a few descriptive clinical studies, featured prominently in these initial stages of the development of FNA in Nigeria.[25,29,30]

Compared to other developing countries, it could be said that cytology practitioners in Nigeria are still a minority,[5] though there is known to be strength in numbers. In India, for instance, the national Academy of Cytology had over 1000 members in 2006, including private practitioners[15-17] In Malaysia, the FNA is believed to have made its debut in the 1980s or earlier. It is now a regular service at virtually all government hospitals and university pathology departments for weekly outpatient, stat inpatient services, and breast clinics incorporating the triple test.[18] It is also reported that FNA practice is increasing rapidly in Vietnam[19] and also widely practiced in South African large state hospitals, medical schools and private facilities.[20] Within the 20-year period we analyzed, a total of 23 articles were published or just about one article was published on cytology each year in Nigeria. This number could be considered low, but it would be inappropriate to attribute this to a laxity on the part of the small cytology community in Nigeria.

If data for the years 1996–2005 were juxtaposed with the data of earlier decade (1986–1995), a steady rise in output (from 5 to 23) of the scholarly publications is evident. Also, author-confidence in local journals appeared to have improved during the later period (accounted for seven new articles or 30.4% as compared to nil in the earlier decade). This implies that indigenous FNA research is still not

Table 3: Diagnostic accuracy of fine needle aspiration in Nigerian studies*

| Article                 | n  | Sensitivity (%) | Specificity (%) |
|------------------------|----|-----------------|-----------------|
| Bhursnamath et al.[25] | 220| 90              | -               |
| Thomas et al.[27]      | 752| 100             | -               |
| Thomas et al.[27]      | 183| 79.5            | 100             |
| Ogunniyi et al.[27]    | 209| 79              | 97              |
| Thomas et al.[28]      | 147| 83              | 80              |
| Mohammed et al.[3]     | 67 | 90              | 100             |
| Mohammed et al.[3]     | 157| 90.6            | 100             |
| Afolayan, 2001[34]     | 63 | 98.1            | -               |
| Shehu and Rafindadi[36] | 189| 96.1            | 98.2            |
| Ngadda et al.[40]      | 42 | 95              | 100             |
| Malami et al.[38]      | 27 | 95              | 96              |
| Tijani et al.[42]      | 41 | 95.4            | 95              |

*Excluding case reports and literature reviews
widely disseminated, and is mostly invisible to influential and critical international audiences. This reason might explain why organized FNA in Nigeria has been deprived of international access and expert educational opportunity for so long. We also examined case-mix, which is an important determinant of the scope and value of an FNA service. Our data show that FNA is frequently used to evaluate patients for suspected TB adenitis. This is not surprising in view of the preponderance of inflammatory lymphadenopathies in Nigeria and the important contribution that FNA can make in the triage of patients. In contrast, lymph node enlargements are not frequent targets of FNA in the developed countries. In the USA, approximately 24% or more of all FNAs are done for the evaluation of neoplastic breast lesions, followed by thyroid (23%) and lung (21%), as opposed to the preponderance of lymphadenopathies seen here. The breast is the second commonest organ aspirated in Nigeria. The works of Mohammed et al., Oggunyi et al., Shehu et al., and Panchalingham et al. were essentially audits of the practice of FNA in palpable breast lumps that employed a method of cyto-histological correlation to determine to establish its diagnostic accuracy. These audits demonstrated a high diagnostic accuracy ranging between 79.0 and 96.1%. Thomas and her group in Ibadan had employed a similar methodology to confirm the high sensitivity and specificity of FNA for suspicious thyroid lesions. The false-negative rates in these studies are generally within acceptable limits, but could be improved with increasing experience.

Among the childhood diseases, FNA was frequently employed for clinical research in cases of Burkitt's lymphoma, which is the predominant childhood tumor in Nigeria, and there was the occasional case report for the management of retinoblastoma. Nigerian cytopathologists equally published notable case reports that described unusual presentations of new and emerging diseases, variations in disease processes, unexpected association between certain diseases or symptoms and findings that shed new light on the etiopathogenesis. Given that prostate cancer is the commonest male cancer in Nigeria, it is surprising that studies that employed FNA in prostatic diseases were lacking. Tijani et al. published a meticulous series demonstrating the usefulness of FNA in this clinical situation. Yet another rare site of FNA is the liver; the only study of this organ during the period studied was published by Nggada et al. They applied FNA to successfully diagnose numerous hepatic lesions including amebic liver abscess and large cell dysplasia, among other conditions. The rarity of lung and head and neck aspirations in the published studies could reflect the preferences of the medical community and also the general prevalence of diseases.

CONCLUSIONS

In our opinion, FNA is yet to reach its full potential in clinical and epidemiological research in Nigeria. Since the present work analyzed publications from the period when FNA was probably being introduced in most of the centers, the accuracy of the cytologists might have been influenced by their relative inexperience. Nonetheless, its value and limitations in the primary diagnosis and monitoring of common tumors and inflammatory conditions in Nigeria had been amply demonstrated. FNA is quick, safe and appropriate for the translational research needs and other medical challenges in the developing world, including Nigeria. It is hoped that with increasing awareness, it would be used more often by interdisciplinary teams as this would help to optimize the scarce resources available to patient care in the country.

COMPETING INTEREST STATEMENT BY ALL AUTHORS

The authors declare that they have no competing interests.

AUTHORSHIP STATEMENT BY ALL AUTHORS

All authors of this article declare that we qualify for authorship as defined by ICMJE http://www.icmje.org/#author. Each author has participated sufficiently in the work and take public responsibility for appropriate portions of the content of this article. Each author acknowledges that this final version was read and approved.

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