International Journal of Reproduction, Contraception, Obstetrics and Gynecology
Aparna et al. Int J Reprod Contracept Obstet Gynecol. 2026 Feb;15(2):673-678
www.ijrcog.org
pISSN 2320-1770 | eISSN 2320-1789

DOI: https://dx.doi.org/10.18203/2320-1770.ijrcog20260190

Original Research Article

Diagnostic efficacy of endometrial aspiration cytology in women with abnormal uterine bleeding and its correlation with histopathology

Aparna[1]*, Veena Gupta[1], Sadhana Pandey[1], Kachnar Verma[2]

[1]Department of Obstetrics and Gynecology, Motilal Nehru Medical College, Prayagraj, Uttar Pradesh, India
[2]Department Of Pathology, Motilal Nehru Medical College, Prayagraj, Uttar Pradesh India

Received: 04 December 2025
Accepted: 08 January 2025

***Correspondence:**
Dr. Aparna,
E-mail: aparnasingh9650@gmail.com

ABSTRACT

Background: Abnormal uterine bleeding (AUB) is a frequent gynecological concern and a major contributor to hysterectomies. Endometrial aspiration cytology (EAC) offers a minimally invasive alternative to dilatation and curettage (D and C) for diagnosing endometrial pathologies. Objective was to assess the diagnostic efficacy of EAC in detecting underlying causes of AUB and correlate its findings with histopathological examination (HPE).
Methods: A prospective analytical study involving 127 women with AUB was conducted. EAC was performed using an infant nasogastric tube, followed by D and C or hysterectomy. The cytological and histological findings were compared.
Results: The mean age was 41.57±8.42 years. Heavy menstrual bleeding was the most common pattern. EAC demonstrated a sensitivity of 66.67%, specificity of 100%, PPV of 100%, and NPV of 99.07% for diagnosing malignancy. Significant cyto-histological correlation was observed ($p<0.001$).
Conclusions: EAC is a safe, cost-effective, outpatient procedure with high specificity for detecting endometrial malignancy. It is especially useful in resource-limited settings as a first-line diagnostic tool.

Keywords: Abnormal uterine bleeding, Adenocarcinoma, Cytological-histological correlation, Endometrial aspiration cytology, Histopathology, Hyperplasia

INTRODUCTION

Abnormal uterine bleeding (AUB) is one of the most frequent and challenging complaints encountered in gynecological practice, affecting women across all age groups, particularly during the perimenopausal and postmenopausal phases. Abnormal uterine bleeding (AUB) is defined as bleeding from the uterine corpus that deviates from the normal in volume, frequency, number of bleeding days, and is not attributable to pregnancy. It is one of the most prevalent and challenging gynecological complaints globally, affecting 14-25% of reproductive-aged women and nearly 50% of perimenopausal women.[1] In India, the prevalence of heavy menstrual bleeding (HMB), a subtype of AUB, has been reported as high as 17.9%.[1] AUB negatively impacts quality of life and remains a leading indication for hysterectomy.

Etiologically, AUB arises from a range of causes including hormonal disturbances, coagulopathies, and structural pathologies such as endometrial polyps, fibroids, adenomyosis, and malignancy. The FIGO PALM-COEIN classification, revised in 2018, categorizes AUB into structural (PALM) and non-structural (COEIN) causes.[2]

Dilatation and curettage (D and C), historically the gold standard for endometrial assessment, is an invasive procedure which requires anesthesia, and may miss focal lesions.[3] Hysteroscopy offers direct visualization but is resource-intensive.[4] Transvaginal sonography (TVS),

although widely used, is operator-dependent and less reliable for subtle lesions.[4]

Endometrial aspiration cytology (EAC) has emerged as a promising, minimally invasive technique with high patient acceptability. It allows outpatient evaluation without the need for anesthesia and can be performed using simple instruments like a Karman cannula, infant feeding tube, or nasogastric tube.[5] EAC offers high sensitivity and specificity, especially in detecting malignancy, and is suitable for resource-constrained settings.[6] Its ability to detect early or occult lesions makes it particularly useful in peri and postmenopausal women, where risk of malignancy is elevated.[7]

However, the technique remains underutilized due to lack of standardization, inadequate awareness among clinicians, and dependency on cytopathological expertise.[6,8]

The present study evaluated the diagnostic efficacy of EAC in identifying causes of AUB and correlates its findings with histopathological results from D&C or hysterectomy.

METHODS

This prospective analytical study was conducted over a period of 18 months, from June 2023 to November 2024, at MLN Medical College, Prayagraj, Uttar Pradesh. A total of 127 women presenting with abnormal uterine bleeding (AUB) were enrolled after obtaining informed consent. The sample size was calculated using Cochran's formula, ensuring statistical validity.

Women included in the study were those scheduled to undergo dilatation and curettage (D and C) or hysterectomy for evaluation and management of AUB. Patients were excluded if they had pregnancy-related bleeding, any diagnosed bleeding disorders, or if they were on hormonal therapy within the last three months. A detailed history was taken, and a thorough clinical examination was performed for all participants. Endometrial aspiration was carried out in the outpatient setting using a sterile, soft infant nasogastric tube without anesthesia. The procedure was simple and well tolerated by most patients. The aspirated material was smeared onto clean glass slides and fixed immediately in 95% ethanol. Three types of stains were used for cytological evaluation: hematoxylin and eosin (H and E), Papanicolaou (PAP), and May-Grünwald-Giemsa (MGG).

Subsequently, all patients underwent D and C or hysterectomy, and the obtained tissue was subjected to histopathological examination (HPE), which served as the gold standard for diagnosis. The cytological findings from EAC were then correlated with histopathological results to evaluate sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and overall diagnostic accuracy.

RESULTS

A total of 127 women presenting with abnormal uterine bleeding were included in the study, with ages ranging from 20 to 70 years. Most cases of abnormal uterine bleeding occurred in women aged 31-40 years (43.3%), followed by 41-50 years (35.4%), with a mean age of 41.57±8.42 years. In this study, 51% of cases were in the reproductive age group, 35.4% in the peri-menopausal group, and 12.6% in post-menopausal women, indicating the high prevalence during reproductive years. AUB was more frequent in multiparous women, with 61.4% having a parity greater than four.

Table 1: Distribution based on age.

Age (years)	Frequency	Percentage
20-30	11	8.7
31-40	55	43.3
41-50	45	35.4
51-60	13	10.2
>60	3	2.4
Total	127	100

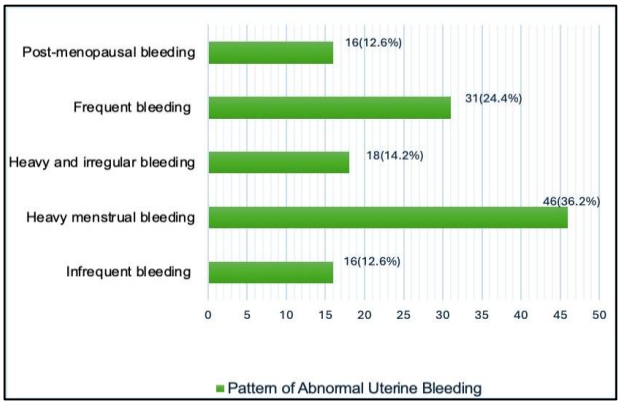

Figure 1: Distribution based on clinical presentation.

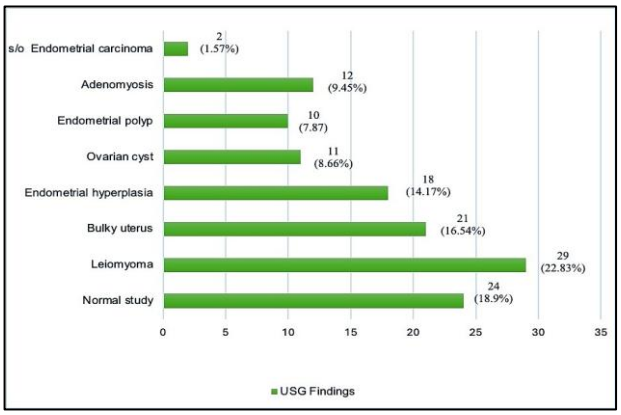

Figure 2: Distribution based on USG findings.

Heavy menstrual bleeding was the most common clinical pattern (37.8%), followed by frequent bleeding (24.4%) and heavy irregular bleeding (14.2%). Symptoms persisted

for 6 months to 1 year in 59.8% of patients, indicating delayed medical consultation. Most patients belonged to the lower-middle socioeconomic class (49.6%), and 55.9% had a BMI of 25-29.9, with a mean BMI of 27.53 kg/m^2. Hypertension was the most common comorbidity (33.9%), followed by hypothyroidism (26%) and diabetes mellitus (15.7%).

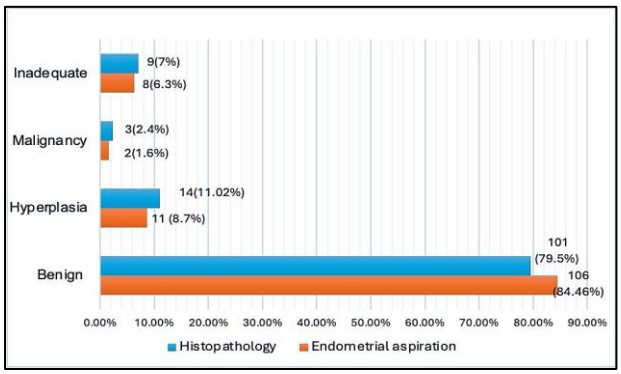

Figure 3: Distribution based on cytodiagnostic categories by endometrial aspiration cytology and histopathology findings.

Table 2: Comparison of inadequate samples in endometrial aspiration cytology and histopathology.

Type of procedure	Frequency	Percentage
EAC	8	6.3
Biopsy	9	7

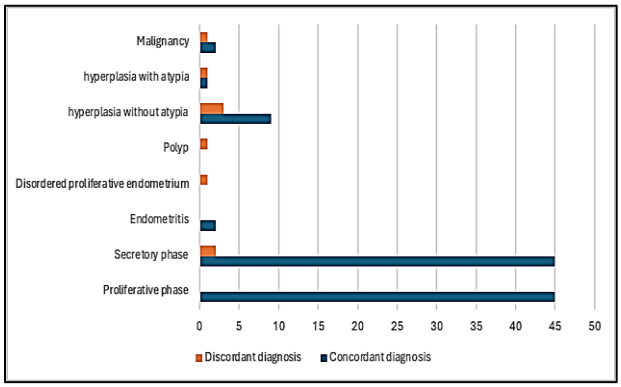

Figure 4: Correlation of endometrial aspiration cytology and histopathology.

Per speculum examination revealed a normal cervix in 62.2% of patients, while cervical hypertrophy (22.04%) and erosion (9.45%) were the most frequent abnormalities. Uterine enlargement to 8-10 weeks size was observed in 40.2% of cases, suggesting fibroids or adenomyosis as possible contributors. PAP smear results showed NILM in 52.76% and chronic cervicitis in 40.16%, while ASCUS and HSIL were reported in 4.72% and 2.36% of cases.

Endometrial aspiration cytology (EAC) was successfully performed in all cases using a sterile infant nasogastric tube. The procedure was well tolerated by patients and resulted in a high rate of adequate samples. Cytological analysis revealed that the most common endometrial pattern was the proliferative phase, followed by secretory phase endometrium. Hyperplasia without atypia was noted in 10.6% of cases, while hyperplasia with atypia and endometrial carcinoma were identified in a smaller subset.

Table 3: Diagnostic performance of endometrial aspiration cytology in case of malignancy.

Variables	Value	95% confidence interval
Sensitivity	66.7%	20.8-93.9%
Specificity	100%	96.7-100%
PPV	100%	34.2-100%
NPV	99.07%	95.1-99.84%

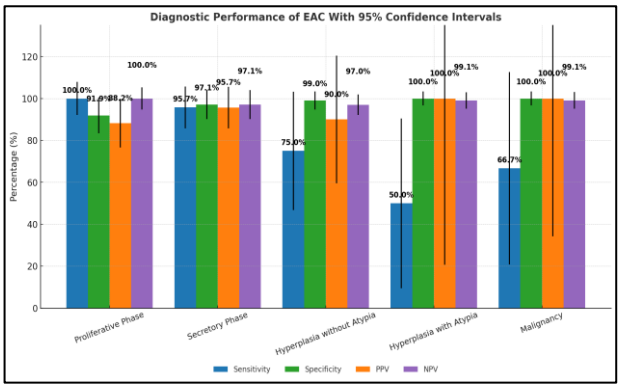

Figure 5: Diagnostic performance of EAC in different phases of endometrium.

Table 4: Diagnostic accuracy of endometrial aspiration cytology.

Phases	Diagnostic accuracy	95% confidence interval
Proliferative phase	94.96%	89.4 to 97.7%
Secretory phase	96.6%	91.5 to 98.7%
Hyperplasia without atypia	96.6%	91.5 to 98.7%
Hyperplasia with atypia	99.12%	95.2 to 99.84%
Malignancy	99.12%	95.2 to 99.84%

The cytohistological correlation showed strong agreement between EAC findings and histopathology. For the proliferative phase, EAC demonstrated a sensitivity of 100%, specificity of 91.9%, positive predictive value (PPV) of 88.2%, and negative predictive value (NPV) of 100%. In the secretory phase, sensitivity was 95.74%, specificity was 97.1%, with both PPV and NPV approaching 96-97%. For hyperplasia without atypia, the sensitivity and specificity were 75% and 99.05%, respectively. In the case of hyperplasia with atypia, although the sensitivity dropped to 50%, specificity remained high at 100%. EAC showed a sensitivity of

66.67% for detecting endometrial carcinoma, with perfect specificity (100%), PPV of 100%, and NPV of 99.07%.

Statistical analysis using the chi-square test confirmed that the correlation between cytological and histological findings was highly significant ($p<0.001$). These results affirm the diagnostic accuracy of EAC, particularly its excellent specificity and NPV, making it an effective tool for ruling out serious endometrial pathology, including malignancy.

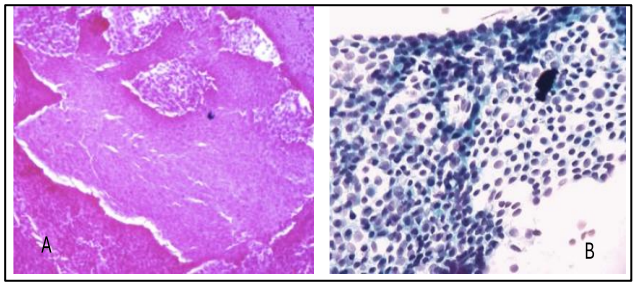

Figure 6 (A and B): EAC smears from hyperplasia without atypia endometrium on PAP and H and E.

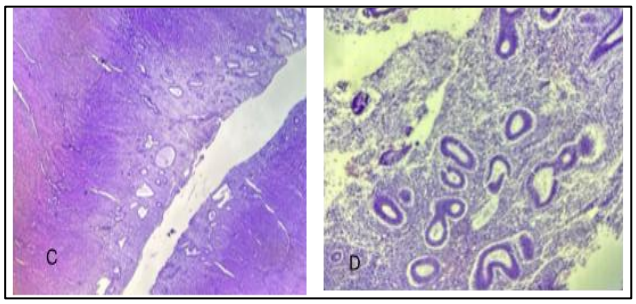

Figure 7 (C and D): EAC smears from disordered proliferative endometrium on H and E.

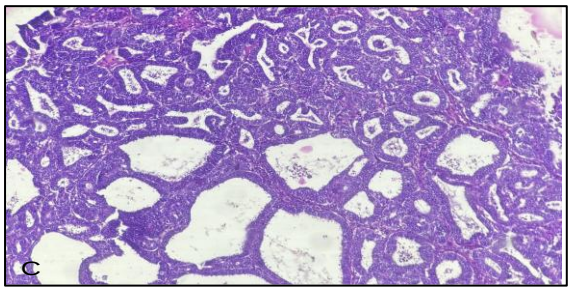

Figure 8: EAC smears from endometrial adenocarcinoma on H and E.

DISCUSSION

Abnormal uterine bleeding (AUB) continues to be one of the most common reasons for gynecologic consultation, particularly in women in their late reproductive and perimenopausal years. In our study, the mean age of presentation for AUB was 41.57±8.42 years, closely aligning with other Indian studies such as Agarwal et al and Awasthi et al, who also reported peak incidence during the perimenopausal years.[8,9] The majority of patients (43.3%) were in the 31-40-year age group. This trend underscores the hormonal instability typical of this phase.

Heavy menstrual bleeding (HMB) was the most common complaint (36.2%), in concordance with the findings of Sarala et al and Jairaj et al.[10,11] Our study also noted a strong association of AUB with comorbidities such as hypertension, hypothyroidism, and diabetes mellitus-trends also observed in studies by Vaidya et al, Santharam et al, and Subedi et al.[12-14]

When comparing endometrial cytology with histopathology, we observed high concordance. Our study reported a sensitivity of 66.7%, specificity of 100%, PPV of 100%, and NPV of 99.07% for detecting malignancy. These findings are comparable with results from studies by Samruddhi et al, Swarnlata et al, and Malik et al.[15-17] For hyperplasia without atypia, sensitivity was 75% and specificity was 99.05%, similar to the findings of Kaur et al and Ashraf et al.[6,18]

We used a nasogastric tube for endometrial aspiration, which demonstrated a high sample adequacy rate and strong diagnostic correlation with histopathology. This supports results from studies like Anita et al, Jadhav et al., and Sharma et al.[1,19,20]

Our study supports the findings of Trupti et al and Gupta et al, who concluded that EAC, particularly with instruments like the Karman cannula or feeding tube, is a viable alternative to D and C for detecting endometrial pathology.[5,21] However, challenges such as sample inadequacy and interpretative variability remain, as previously mentioned by Maksem et al and Yanoh et al.[22,23]

Overall, our findings reinforce that endometrial aspiration cytology is a reliable, low-cost, and minimally invasive technique that can be effectively used in outpatient settings for early diagnosis and triage of women with AUB.

This study had a few limitations. The sample size, while adequate, may not represent the wider population. The accuracy of EAC largely depends on the skill of the operator and experience of the pathologist, which may introduce variability. In some postmenopausal women, sample inadequacy due to atrophic endometrium could affect diagnostic yield. Additionally, the moderate sensitivity for detecting atypical hyperplasia and malignancy suggests that EAC should be interpreted cautiously in high-risk case.

CONCLUSION

EAC is a safe, outpatient-based, and effective diagnostic procedure, particularly suited for resource-constrained settings. While not a complete substitute for histopathology, it serves as a robust initial screening tool for AUB, especially in excluding malignancy.

Recommendations

Based on the findings of this study, endometrial aspiration cytology (EAC) should be promoted as a first-line diagnostic tool in the evaluation of abnormal uterine bleeding, especially in primary and secondary care settings. Its simplicity, safety, cost-effectiveness, and patient acceptability make it an ideal alternative to dilatation and curettage, particularly in resource-limited environments. EAC can serve as a valuable triaging tool, identifying patients who require further investigation or definitive management through hysteroscopy or histopathological confirmation. To maximize its diagnostic potential, efforts should be made to improve awareness and training among gynecologists and pathologists in performing and interpreting EAC. Additionally, standardized criteria for cytological interpretation and reporting should be developed and adopted across healthcare institutions. Integrating EAC into national screening protocols for endometrial pathology could significantly enhance early detection of precancerous and malignant lesions, thereby improving outcomes for women with AUB.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Sharma A et al. Abnormal uterine bleeding: A review. J Gynecol Obstet. 2021. Depan A, Bissa U, Meherda K, Sharma A. A clinical evaluation of the cases based on new FIGO classification system- PALM-COEIN. Int J Sci Res. 2017;6(12).
2. Munro MG, Critchley HO, Fraser IS, FIGO Working Group on Menstrual Disorders. The FIGO classification of causes of abnormal uterine bleeding. Int J Gynaecol Obstet. 2011;113:1-2.
3. Kistner RW. Gynaecology: Principles and Practice. Chicago: Year Book; 1964:238.
4. Twinkle, Khan A, Nigar A, Singh K, Gupta B, Khan MF. Hysteroscopic evaluation in patients with abnormal uterine bleeding and its correlation with histopathology. Indian J Obstet Gynecol Res. 2023;10(4):426-32.
5. Dongre TA, Maimoon SA. Endometrial aspiration cytology: A cross- sectional comparative study of its efficacy and sensitivity in diagnosing gynecological disorders. Cureus. 2023;15(7):e41699.
6. Kaur N, Chahal JS, Bandlish U, Kaul R, Mardi K, Kaur H. Correlation between cytological and histopathological examination of the endometrium in abnormal uterine bleeding. J Cytol. 2014;31(3):144-8.
7. Kawana K, Yamada M, Jimbo H, Shirai T, Takahashi M, Sano Y, et al. Diagnostic usefulness of endometrial aspiration cytology for endometrial cancer cases with normal curettage findings. Acta Cytol. 2005;49(5):507-12.
8. Kaur G, Agarwal P. Role of hysteroscopy in management of abnormal uterine bleeding in perimenopausal women. Int J Reprod Contracept Obstet Gynecol. 2016;5(6):1690-5. Awasthi R et al. Demographic profile in AUB. J Evol Med Dent Sci. 2017.
9. Avasthi K, Bhavani BH, Gilhotra S, Goyal A. A study to correlate clinical with pathological findings in abnormal uterine bleeding (AUB). Int J Clin Obstet Gynaecol. 2023;7(6):80-8.
10. Sarala V, Gopalan U. Clinical pattern and presentation of abnormal uterine bleeding. Int J Reprod Contracept Obstet Gynecol. 2020;9:126-8.
11. Jairajpuripuri ZS, Rana S, Jetley S. Atypical uterine bleeding- histopathological audit of endometrium: a study of 638 cases. Al Ameen J Med Sci. 2013;6(1):21-8.
12. Vaidya S, Lakhey M, Vaidya S, Sharma PK, Hirachand S, Lama S, et al. Histopathological pattern of abnormal uterine bleeding in endometrial biopsies. Nepal Med Coll J. 2013;15(1):74-7.
13. Santharam M, Sekar P, Karthikeyan TM, Kandaswamy S. A study on histomorphological spectrum in abnormal uterine bleeding at a tertiary care center. Nat Board Exam J Med Sci. 2025;3(1):39-48.
14. Subedi S, Banerjee B, Manisha C. Thyroid disorders in women with dysfunctional uterine bleeding. J Pathol Nepal. 2016;6(12):1018-20. Samruddhi S et al. EAC diagnostic accuracy. J Obstet Gynaecol India. 2022.
15. Thakare SS, Nikumbh DB, Dravid NV, Damle RP, Deore PN. Efficacy of endometrial aspiration cytology in diagnosis of endometrial pathologies in a tertiary care centre. Int J Health Clin Res. 2022;5(2):1075-80
16. Ajmera S, Gupta S, Ajmera R. Diagnostic efficacy of endometrial aspiration cytology with histopathological correlation. Int J Med Biomed Stud. 2021;5(7).
17. Malik R, Agarwal R, Tandon P. Cytological assessment of endometrial washings obtained with an insemination cannula and its histological correlation. J Cytol. 2008;25:128-32.
18. Ashraf S, Jabeen F. A comparative study of endometrial aspiration cytology with dilatation and curettage in patients with dysfunctional uterine bleeding, perimenopausal and postmenopausal bleeding. JK Pract. 2014;19.
19. Kumari A, Amita K. Diagnostic efficacy of endometrial aspiration cytology in abnormal uterine bleeding: a cross-sectional study at a tertiary care hospital. Online J Health Allied Scs. 2021;20(3):13.
20. Jadhav MV, Phatke AS, Kadgi NV, Rane SR, Kulkarni KK. Endometrial aspiration cytology in gynecological disorders. J Cytol. 2016;33:13-6.
21. Gupta M, Gupta P, Yadav P. A randomized comparative study to compare Karman's cannula and Pipelle biopsy for evaluation of abnormal uterine bleeding. J Midlife Health. 2022;13(1):67-73

22. Meiers I, Bishop JW, Robboy SJ, Maksen J. Endometrial cytology with tissue correlations. 1st edn. New York: Springer; 2009:220
23. Yanoh K, Norimatsu Y, Hirai Y, Takeshima N, Kamimori A, Nakamura Y, et al. New diagnostic reporting format for endometrial cytology based on cytoarchitectural criteria. Cytopathology. 2009;20(6):388-94.

Cite this article as: Aparna, Gupta V, Pandey S, Verma K. Diagnostic efficacy of endometrial aspiration cytology in women with abnormal uterine bleeding and its correlation with histopathology. Int J Reprod Contracept Obstet Gynecol 2026;15:673-8.