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ORIGINAL ARTICLE

A Comparative Study of Complication Rates of Total Thyroidectomy and Hemithyroidectomy in the Treatment of Papillary Thyroid Carcinoma

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ABSTRACT

Background: *Thyroid carcinoma is the most common endocrine malignancy, and papillary thyroid carcinoma (PTC) is the most common histologic type. Surgery remains the mainstay of therapy, and the two most encountered surgical procedures are total thyroidectomy (TT) and hemithyroidectomy (HT). The choice of surgery is often determined by tumor characteristics, surgeon preference, and institutional practice, each having certain.* ***Objectives:*** *The aim of this study was to assess the complication rates of total thyroidectomy versus Hemithyroidectomy in the treatment of papillary thyroid carcinoma.* ***Methods & Materials:*** *This cross-sectional observational study was conducted in the Department of ENT, Head and Neck Surgery, Anwer Khan Modern Medical College Hospital, Dhaka, Bangladesh from June 2023 to May 2025. Total 120 patients diagnosed with papillary thyroid carcinoma (PTC) were included in this study.* ***Results:*** *The two groups were comparable in baseline demographic and clinical characteristics (p>0.05). The majority of surgeries lasted less than 60 minutes in both groups (70.8%) (p=0.841). Intraoperative hemorrhage occurred in 56.7% of cases, with no statistical difference between TT and HT groups (p=0.711). Postoperatively, pain was the most frequent complication (51.7%), followed by hemorrhage (32.5%). Vocal cord paralysis was significantly higher in the TT group (11.7% vs. 1.7%, p=0.0291), while other complications such as pain, hemorrhage, and voice change showed no significant group differences.* ***Conclusion:*** *Both surgical approaches demonstrated comparable safety profile. However, total thyroidectomy carried a higher risk of vocal cord paralysis. Hemithyroidectomy can therefore be utilized as a safer alternative in well-selected PTC patients.*

Keywords: *Complication Rates, Total Thyroidectomy, Hemithyroidectomy, and Papillary Thyroid Carcinoma.*

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INTRODUCTION

Papillary thyroid carcinoma (PTC) is the most prevalent type of thyroid cancer, accounting for approximately 85–90% of all thyroid cancer cases worldwide.[1] The disease typically follows an indolent course with excellent long-term outcomes, and 10-year survival rates exceeding 95% have been repeatedly shown in large population-based studies.[1,2] Against this favorable oncological background, surgery remains the cornerstone of management, and controversy about the degree of surgery, total thyroidectomy (TT) versus hemithyroidectomy (HT)—has persisted for decades.[3,4]

Over the last decade, international guidelines have moved to accept that less surgery may be appropriate for well-selected patients. The 2015 American Thyroid Association (ATA) guidelines were a paradigm shift as they officially recognized lobectomy or HT as an acceptable definitive treatment for low-risk, intrathyroidal PTCs up to 4 cm.[5] This was corroborated by accumulating observational data demonstrating no survival advantage of TT over HT in this group of patients. Conversely, the National Comprehensive Cancer Network (NCCN) continues to recommend TT in patients with higher risk features such as extrathyroidal extension, nodal or distant metastasis, aggressive histological subtypes, bilateral disease, or a history of previous radiation exposure.[6,7] These risk-stratified strategies have yielded a measurable increase in the

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use of HT worldwide, reflecting a broader trend for de-escalation in surgical oncology.[7]

This de-escalation has created a well-defined risk–benefit trade-off. TT provides pragmatic advantages, including the facility of postoperative radioactive iodine (RAI) ablation and more reliable thyroglobulin-based surveillance.[8] However, excision of the entire gland significantly increases the risk of postoperative complications, most commonly transient hypocalcaemia, which occurs in 20–30% of TT patients, and permanent hypoparathyroidism, which occurs in approximately 1–3%.[9,10] In addition, recurrent laryngeal nerve (RLN) palsy has been reported in 1–5% of cases, permanent injury in less than 1% but consistently more frequent after TT than HT.[11,12] Less frequent complications of postoperative haematoma, infection, and chyle leak have a disproportionate impact on morbidity and can require urgent reoperation.[13,14] In contrast, HT reduces many of these risks by avoiding bilateral gland dissection but at the cost of potentially more complicated surveillance and an increased risk of contralateral recurrence necessitating completion thyroidectomy.[15,16]

Contemporary comparative data showcases these conflicting outcomes. Meta-analyses all demonstrate that HT is associated with significantly fewer complications but with a modestly increased risk of recurrence, particularly contralateral recurrences.[3,15-17] Oncologic equivalence in the long term is contentious, with survival outcomes appearing comparable between methods but recurrence-free survival tending to favour TT, especially in intermediate-risk tumours.[1,18] Importantly, these comparisons are constrained by significant heterogeneity in complication definitions, patient selection criteria, and surgical experience among studies, precluding direct comparison.[7,16] The recent meta-analyses' methodological shortcomings also underline the need for robust, standardised comparison studies.[16]

Taken together, this evolving body of evidence emphasizes the urgent requirement for contemporary, carefully designed comparative analyses to guide surgical decision-making in PTC. The present study aims to evaluate and compare the complication profiles of total thyroidectomy and hemithyroidectomy in the treatment of papillary thyroid carcinoma.

OBJECTIVES

To assess the complication rates of total thyroidectomy versus Hemithyroidectomy in the treatment of papillary thyroid carcinoma.

METHODS & MATERIALS

This cross-sectional observational study was conducted in the Department of ENT, Head and Neck Surgery, Anwer Khan Modern Medical College Hospital, Dhaka, Bangladesh, over a two-year period from June 2023 to May 2025. Total 120 patients diagnosed with papillary thyroid carcinoma (PTC) were included in this study. All patients were evaluated through detailed history-taking, clinical examination, imaging, and fine-needle aspiration cytology (FNAC) to confirm the diagnosis and assess disease extent. The study patients were divided into two groups, each containing 60 participants, based on the extent of surgery: those who underwent total thyroidectomy (TT) and those who underwent hemithyroidectomy (HT). The choice of surgical procedure was made in accordance with established American Thyroid Association (ATA) and National Comprehensive Cancer Network (NCCN) guidelines, as well as patient preference and intraoperative findings. Central or lateral neck dissections were performed in patients with clinically or radiologically evident nodal metastasis. All surgeries were carried out by experienced head and neck surgeons using standardized operative techniques. Intraoperative details, including operative time, estimated blood loss, use of intraoperative nerve monitoring, and parathyroid gland identification or auto-transplantation, were recorded. Postoperative monitoring included serial assessment of serum calcium and parathyroid hormone levels at 6, 24, and 48 hours, along with laryngoscopic evaluation of vocal cord mobility to detect recurrent laryngeal nerve (RLN) injury. Patients were followed during their hospital stay and subsequently at 1, 3, 6, and 12 months postoperatively, with further follow-up as clinically indicated. The primary outcomes assessed were the incidence of postoperative complications, including temporary and permanent hypocalcemia/hypoparathyroidism, temporary and permanent RLN palsy, postoperative hematoma, surgical site infection, and chyle leak. Temporary hypocalcemia was defined as symptomatic or biochemical hypocalcemia requiring supplementation that resolved within six months, whereas permanent hypoparathyroidism was defined as persistent hypocalcemia requiring supplementation beyond six months. Similarly, temporary RLN palsy was defined as postoperative vocal cord dysfunction resolving within six months, while permanent palsy was defined as persistence beyond this period. Secondary outcomes included need for reoperation, 30-day readmission, and recurrence during the study period. Data were collected using a structured case record form and entered into a secured database. Comparative analysis between the TT and HT groups was performed using the chi-square test. A p-value of <0.05 was considered statistically significant. Statistical analysis was performed using SPSS version 26.0 (IBM Corp., Armonk, NY, USA). Ethical approval for the study was obtained from the Institutional Review Board of Anwer Khan Modern Medical College Hospital. Written informed consent was obtained from all participants prior to enrolment.

RESULTS

Table I shows the demographic characteristics of the study population comprising 120 patients, equally divided into the total thyroidectomy (TT) group (n=60) and the hemithyroidectomy (HT) group (n=60). The age distribution revealed that the majority of patients were within 41–60 years (54.2%), followed by 21–40 years (39.2%), while only 6.7% were aged 0–20 years. The mean age distribution was comparable between the two groups, with no significant difference (p=0.991). Female patients predominated overall, accounting for 65% of the study population, compared to 35% males, with a similar distribution across both groups

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(p=0.698). Regarding occupation, 38.3% of participants were employed, 35.8% were housewives, and 25.8% were students, with no statistically significant difference between the TT and HT groups (p=0.923). Thus, the two study groups were well-matched in terms of baseline demographic characteristics.

Figure 1 illustrates the distribution of blood groups across the study population, showing that the most common blood group was B-positive, observed in 40.8% of patients, with a slightly higher prevalence in the hemithyroidectomy (HT) group (43.3%) compared to the total thyroidectomy (TT) group (38.3%). O-positive blood group accounted for 35.0% of the study population, distributed nearly equally between the TT group (36.7%) and the HT group (33.3%). A-positive blood group was the least common, present in 24.2% of cases, with similar proportions in both TT (25.0%) and HT (23.3%) groups. Statistical analysis showed no significant difference in blood group distribution between the two groups (p=0.801), indicating comparability with respect to this baseline characteristic.

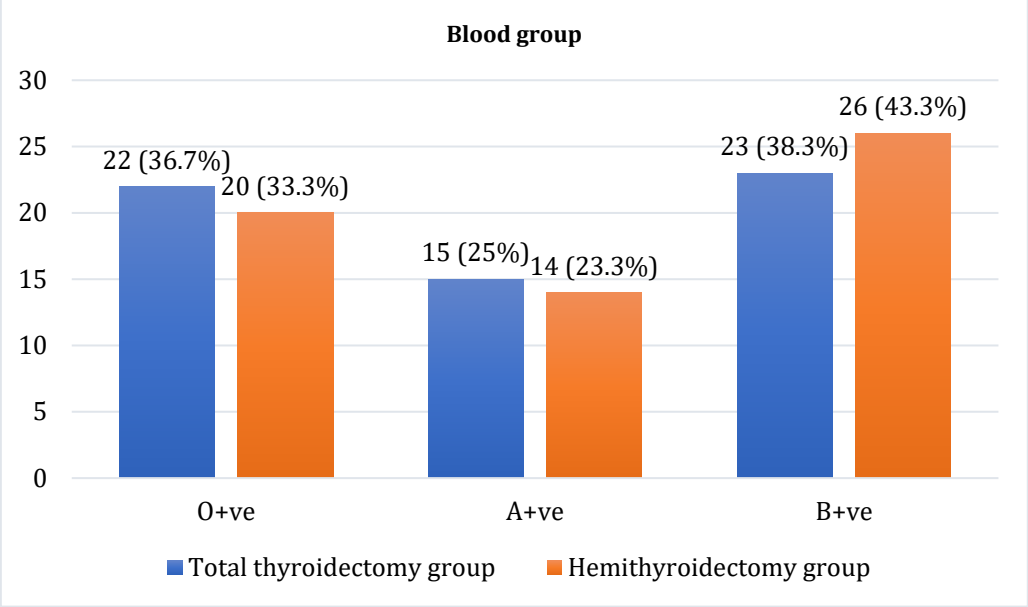
Table II presents intra-operative outcomes. The duration of surgery was less than 60 minutes in the majority of cases (70.8%), with 71.7% in the HT group and 70.0% in the TT group, while the remaining cases lasted 60–80 minutes. The difference in operative duration between the two groups was not statistically significant (p=0.841). Intra-operative hemorrhage was the most frequent complication, observed in 56.7% of cases, affecting 58.3% of TT patients and 55.0% of HT patients, again showing no significant difference between groups (p=0.711).

Table III highlights the post-operative complications encountered. Pain was the most common complication, affecting 51.7% of patients, and was more frequent in the HT group (60%) compared to the TT group (43.3%), though this difference did not reach statistical significance (p=0.0683). Hemorrhage occurred in 32.5% of cases, nearly equally distributed between TT (33.3%) and HT (31.7%) groups (p=0.8522). Vocal cord paralysis was identified in 6.7% of patients, with a significantly higher incidence in the TT group (11.7%) compared to the HT group (1.7%) (p=0.0291). Voice change was reported in 9.2% of cases, with a slightly higher proportion in the TT group (11.7%) compared to HT (6.7%), but the difference was not statistically significant (p=0.3454).

Table – I: Demographic characteristics of the study groups (N=120)

Characteristics	Total thyroidectomy group (n=60)	Hemithyroidectomy group (n=60)	Total (N=120)	P-value
Age group (years)				
0–20	4 (6.7%)	4 (6.7%)	8 (6.7%)	0.991
21–40	23 (38.3%)	24 (40.0%)	47 (39.2%)	
41–60	33 (55.0%)	32 (53.3%)	65 (54.2%)	
Sex				
Male	22 (36.7%)	20 (33.3%)	42 (35.0%)	0.698
Female	38 (63.3%)	40 (66.7%)	78 (65.0%)	
Occupation				
Student	16 (26.7%)	15 (25.0%)	31 (25.8%)	0.923
Housewife	21 (35.0%)	22 (36.7%)	43 (35.8%)	
Job	23 (38.3%)	23 (38.3%)	46 (38.3%)	

P-value calculated using chi-square test



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Figure – 1: Blood group distribution between the study groups (*n*=120)

Table – II: Comparison of intra-operative outcome between the study groups (*n*=120)

Intra-operative outcome	Total thyroidectomy group (n=60)	Hemithyroidectomy group (n=60)	Total (N=120)	P-value
Duration				
0–60 min	42 (70.0%)	43 (71.7%)	85 (70.8%)	0.841
60–80 min	18 (30.0%)	17 (28.3%)	35 (29.2%)	
Complication				
Hemorrhage	35 (58.3%)	33 (55.0%)	68 (56.7%)	0.711

P-value calculated using chi-square test

Table – III: Comparison of post-operative complications between the study groups (*n*=120)

Complications	Total thyroidectomy group (n=60)	Hemithyroidectomy group (n=60)	Total (N=120)	P-value
Pain	26 (43.3%)	36 (60%)	62 (51.7%)	0.068
Hemorrhage	20 (33.3%)	19 (31.7%)	39 (32.5%)	0.852
Vocal cord paralysis	7 (11.7%)	1 (1.7%)	8 (6.7%)	0.029*
Voice change	7 (11.7%)	4 (6.7%)	11 (9.2%)	0.345

P-value calculated using chi-square test
**= significant*

DISCUSSION

This study contrasted complication profiles for hemithyroidectomy (HT) and total thyroidectomy (TT) in papillary thyroid carcinoma (PTC) patients, with regard to demographic similarity, intraoperative results, and postoperative complications. Our demographic profile showed that the majority of the patients were middle-aged, particularly in the 41–60 years group, consistent with prevailing epidemiological data suggesting PTC is most prevalent among women and usually diagnosed between the third and sixth decades of life.[19] This female predominance (65%) in our cohort is also consistent with international reports in which women are disproportionately represented, a trend explained by both hormonal and genetic susceptibility.[20] Notably, the lack of any large demographic differences between TT and HT groups supports the value of ensuing comparisons in surgical and complication outcomes.

Blood group distribution in the current study showed B-positive to be most prevalent, followed by O-positive and A-positive. Although no statistically significant variations were noted between TT and HT groups, the result has been in accordance with regional data showing variable distribution of ABO blood groups in populations of thyroid carcinomas. However, the absence of certain biologic relationship between thyroid surgical outcome and blood type diminishes the interpretive importance of this result, but it contributes to the characterization of the patient population.

Intraoperative outcomes indicated that the majority of operations were completed within 60 minutes, and operating time was not meaningfully different for TT and HT. This finding is in agreement with data indicating that operative duration is more related to intraoperative anatomy and surgeon skill than to extent of surgery alone.[21] Intraoperative bleeding was observed in more than half of patients, again with no noteworthy group differences. Although in the study of Dralle et al.[22], postoperative hemorrhage ranged from 0.3% to 4.2%, our experience may reflect the accumulation of small intraoperative bleeding incidents not always included as complications elsewhere. Because the thyroid is so very vascular, this finding places emphasis on the attention to detail in hemostatic technique regardless of size of operation.

Postoperative complication was the middle comparative component of this research. The most frequent postoperative symptom was pain in 51.7% of the patients, with a tendency toward higher frequency in HT, but not significantly statistical. This contrasts with the study of Pagliaro et al.[23] that reported higher pain with more prolonged neck hyperextension in TT, but agrees with findings of Lang et al.[24] that surgical position and subjective pain perception can cause postoperative discomfort. Hemorrhage was recorded in about one-third of the patients, equally distributed between TT and HT, a finding that the level of resection does not in itself signify risk of bleeding, in line with reviews placing thyroid vascularity and intraoperative factors above surgery extent.[25]

Of particular note, vocal cord paralysis was also significantly more frequent in TT (11.7%) compared to HT (1.7%). This finding is clinically relevant since RLN injury is a recognized complication, with the study of Han et al.[26], reporting temporary paralysis rates in the order of 3–4% and permanent paralysis less than 1%. Our incidences are greater than many contemporary series, possibly due to the greater anatomical dissection and bilateral exposure of the nerve inherent to TT. Similarly, in the study of Lee et al.[27], voice change was found in 9.2% of all patients, moderate compared to evidence that 87% of all patients report subjective voice trouble following thyroidectomy independent of nerve damage. These differences may result from heterogeneity of patient-reported outcomes, surgeon preference, and perioperative care.

Overall, our findings confirm the growing literature that while TT allows for adjuvant treatment and oncological follow-up, it

subjects the patient to more complications, specifically RLN injury, compared to HT. Conversely, HT offers lower complication rates but could adversely affect follow-up and treatment in high-risk patients.

CONCLUSION

This study concludes that both total thyroidectomy and hemithyroidectomy are effective surgical options for managing papillary thyroid carcinoma, with comparable demographic distribution, operative duration, and general complication rates. However, total thyroidectomy was associated with a significantly higher incidence of vocal cord paralysis, underscoring its greater risk profile. In contrast, hemithyroidectomy offered a safer alternative with fewer major complications. Careful patient selection and individualized surgical planning remain essential to optimize outcomes and minimize postoperative morbidity in thyroid carcinoma management.

REFERENCES

1. *Liu X, Wong CKH, Chan WWL, Au ICH, Tang EHM. Survival after hemithyroidectomy versus total thyroidectomy in non-high-risk differentiated thyroid cancer: population-based analysis. BJS Open. 2022;6(6):zrac146.*
2. *Rapoport A, Curioni OA, Amar A. Review of survival rates 20-years after conservative surgery for papillary thyroid carcinoma. Braz J Otorhinolaryngol. 2015;81(6):683–7.*
3. *Rodriguez Schaap PM, Botti M, Otten RHJ. Hemithyroidectomy versus total thyroidectomy for well differentiated T1–2 N0 thyroid cancer: systematic review and meta-analysis. BJS Open. 2020;4(6):987–98.*
4. *Geron Y, Benbassat C, Shteinshneider M, Koren S. Long-term outcome after hemithyroidectomy for papillary thyroid cancer: a comparative study and review of the literature. Cancers (Basel). 2018;11(1):26.*
5. *Haugen BR, Alexander EK, Bible KC, Doherty GM, Mandel SJ, Nikiforov YE, et al. 2015 American Thyroid Association management guidelines for adult patients with thyroid nodules and differentiated thyroid cancer. Thyroid. 2016;26(1):1–133.*
6. *Addasi N, Fingeret A, Goldner W. Hemithyroidectomy for thyroid cancer: a review. Medicina (Kaunas). 2020;56(11):586.*
7. *Kovatch KJ, Hoban CW, Shuman AG. Thyroid cancer surgery guidelines in an era of de-escalation. Oral Oncol. 2018;87:113–8.*
8. *Miccoli P, Bakkar S. Surgical management of papillary thyroid carcinoma: an overview. Updates Surg. 2017;69(2):145–50.*
9. *Orloff LA, Wiseman SM, Bernet VJ, Fahey TJ, Shaha AR, Shindo ML, et al. American Thyroid Association statement on postoperative hypoparathyroidism: diagnosis, prevention, and management in adults. Thyroid. 2018;28(7):830–41.*
10. *Dhillon VK, Ng CH, Kim GHJ, Kim J, Fraser S, Kim HY, et al. Hypocalcaemia and hypoparathyroidism following thyroidectomy: a comprehensive review. Ann Thyroid. 2023;8:13.*
11. *Baud G, Pons Y, Lallemant B, Chamorey E, Lallemant JG, Veyssiere A, et al. Impact of lymph node dissection on postoperative outcomes after thyroid surgery: a multicentric study. Cancers (Basel). 2022;14(21):5462.*
12. *Gerardi C, Campisi S, Lapenna R, Vannucci L, Trezzi R, Bini V, et al. Thyroidectomy and its complications: a comprehensive overview. Biomedicines. 2025;13(2):433.*
13. *Abdallah M, Saad M, El-Kased AF, Mohamed MM. Complications following thyroidectomy: a retrospective study in a tertiary hospital. Egypt J Surg. 2024;43(2):241–7.*
14. *Pham L, Vuong M, Ngo T, Nguyen P. Surgical complications in papillary thyroid cancer. World J Surg Oncol. 2024;22:35.*
15. *Chan S, Karamali K, Kolodziejczyk A. Systematic review of recurrence rate after hemithyroidectomy for low-risk well-differentiated thyroid cancer. Eur Thyroid J. 2020;9(2):65–72.*
16. *Hsiao V, Light TJ, Adil AA, Tao M. Complication rates of total thyroidectomy vs hemithyroidectomy for treatment of papillary thyroid microcarcinoma: a systematic review and meta-analysis. JAMA Otolaryngol Head Neck Surg. 2022;148(6):511–9.*
17. *Van Dijk SPJ, Coerts HI, Lončar I, van den Heuvel ER, van den Broek GB, van den Broek MAJ. Deescalating follow-up after hemithyroidectomy for patients with low-risk papillary thyroid microcarcinoma. JAMA Otolaryngol Head Neck Surg. 2023;149(1):23–31.*
18. *Guo MY, Wiseman JJ, Wiseman SM. Current surgical treatment of intermediate-risk differentiated thyroid cancer: a systematic review. Expert Rev Anticancer Ther. 2021;21(2):139–50.*
19. *Lim H, Devesa SS, Sosa JA, Check D, Kitahara CM. Trends in Thyroid Cancer Incidence and Mortality in the United States, 1974–2013. JAMA. 2017;317(13):1338–48.*
20. *Rahbari R, Zhang L, Kebebew E. Thyroid cancer gender disparity. Future Oncol. 2010;6(11):1771–9.*
21. *Alam M, Khokhar MS, Saba K, Qureshi S, Shaikh AR. Surgical outcome of total thyroidectomy versus hemithyroidectomy in patients with benign multinodular goiter. J Ayub Med Coll Abbottabad. 2017;29(3):408–11.*
22. *Dralle H, Sekulla C, Lorenz K, Brauckhoff M, Machens A. Intraoperative monitoring of the recurrent laryngeal nerve in thyroid surgery. World J Surg. 2012;36(7):1343–57.*
23. *Pagliaro M, Segna RA, Bellussi LM, Giannoni B, Gallo O. Post-thyroidectomy pain: a prospective randomized study comparing total versus hemithyroidectomy. Acta Otorhinolaryngol Ital. 2024;44(1):23–30.*
24. *Lang BH, Ng SH, Lau LL, Cowling BJ, Wong KP. A systematic review and meta-analysis comparing surgically-related complications between robotic-assisted thyroidectomy and conventional open thyroidectomy. Ann Surg Oncol. 2015;22(3):747–54.*
25. *Pontin A, Ruggieri M, Di Cristofano C, Testa A, Bellantone R, Lombardi CP. Postoperative bleeding after thyroid surgery: care and treatment. Gland Surg. 2019;8(Suppl 1):S33–9.*
26. *Han Z, Gong RX, Huang Y, Chen L, Xu XC, Yang Y, et al. Incidence and risk factors of recurrent laryngeal nerve injury after thyroidectomy: a national multicenter study in China. Head Neck. 2024;46(2):431–9.*
27. *Lee YM, Chang JW, Oh KH, Kim SY, Koo YS. Prevalence and factors related to voice changes after thyroid surgery: a prospective cohort study. Thyroid. 2025;35(1):55–62.*