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***Original Research Article***

# Frequency of Hypocalcemia after Total Thyroidectomy: A Clinical Study

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**Abstract:** *Hypocalcaemia is the most frequent complication following total thyroidectomy, resulting from parathyroid gland injury or devascularization. It can cause transient or permanent metabolic disturbances, requiring close monitoring and intervention. The burden of hypocalcaemia is particularly relevant in Pakistan due to prevalent nutritional deficiencies and variations in surgical expertise.* ***Objective:*** *To determine the frequency of hypocalcaemia following total thyroidectomy and assess its association with age and gender in a tertiary care hospital in Pakistan.* ***Methods:*** *This descriptive case series was conducted at the Department of General Surgery and Surgical Oncology, Sheikh Zayed Hospital, Lahore, from December 16, 2024, to May 15, 2025. A total of 88 patients undergoing total thyroidectomy were included through consecutive non-probability sampling. Patients with recurrent thyroid swelling or preoperative hypocalcaemia were excluded. Serum calcium levels were measured preoperatively, 24 and 48 hours postoperatively, and on the fifth postoperative day. Hypocalcaemia was a corrected serum calcium level <2.1 mmol/L within five days post-surgery. Data were analyzed using SPSS version 20.0, with a chi-square test applied for associations; $p \leq 0.05$ was considered significant.* ***Results:*** *The mean age of participants was 42.6 ± 11.8 years (range 19–68), with a female predominance (75%). The average thyroid swelling size was 5.2 ± 1.6 cm. Mean serum calcium declined significantly postoperatively: 2.34 ± 0.12 mmol/L preoperatively, 2.05 ± 0.18 mmol/L at 24 hours, and 2.00 ± 0.21 mmol/L at 48 hours, followed by partial recovery on the fifth day (2.07 ± 0.16 mmol/L). Overall, 30 patients (34.1%) developed hypocalcaemia. No significant association was found between hypocalcaemia and age ($p = 0.98$) or gender ($p = 0.47$).* ***Conclusion:*** *Hypocalcaemia was observed in nearly one-third of patients following total thyroidectomy, with no significant influence of age or gender. These findings highlight the need for routine postoperative calcium monitoring, patient counseling, and early supplementation to minimize morbidity. Preoperative correction of nutritional deficiencies and standardized surgical protocols are essential to improve outcomes in the Pakistani context.*

**Keywords:** Hypocalcaemia, Total thyroidectomy, Serum calcium, Postoperative complication, Pakistan

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## Introduction

Hypocalcaemia is a significant complication following total thyroidectomy (TT), often resulting from inadvertent injury to the parathyroid glands or disruption of their blood supply during surgery. The incidence of hypocalcaemia post-TT can vary widely across studies, influenced by factors such as surgical technique, pre-existing conditions, and patient demographics. The mechanisms of hypocalcaemia after TT primarily involve damage to the parathyroid glands, leading to secondary hypoparathyroidism, which can present as both transient and permanent hypocalcaemia (1, 2, 3). This complication not only necessitates extended hospitalization in some cases but can also detrimentally impact the patient's quality of life, manifesting as symptoms ranging from paresthesia and muscle spasms to potentially severe neuromuscular irritability (4, 5).

Recent literature indicates that transient hypocalcaemia may arise immediately or several days after the surgery, while permanent cases can manifest weeks or even months later. For instance, Atikuzzaman et al. Reported that a notable proportion of cases exhibit hypocalcaemia in the early postoperative phase, continuing past the initial week and extending up to six months (6). Therefore, postoperative monitoring of serum calcium levels is crucial, as inadequate levels can lead to severe clinical concerns requiring medical intervention. Such vigilance is vital for patients undergoing comprehensive surgical approaches, including total thyroidectomy in conjunction with neck dissection, which significantly increases the likelihood of developing hypocalcaemia (7, 8).

Additionally, preoperative factors such as vitamin D levels play a pivotal role in predicting postoperative outcomes. Several studies confirm that patients with vitamin D deficiency are at a heightened risk for developing postoperative hypocalcaemia. The correlation between preoperative vitamin D status and the risk of postoperative hypocalcaemia has been substantiated across various cohorts, underscoring the importance of assessing and potentially correcting vitamin D deficiency before thyroid surgery (9, 10, 11). This proactive approach may help minimize the incidence of postoperative complications.

In the context of Pakistan, a thorough understanding of the frequency and contributing factors of hypocalcaemia post-TT among the local population is essential. With the increasing prevalence of thyroid diseases in the region, coupled with limited healthcare resources and inconsistencies in preoperative screening practices, greater awareness and systematic investigation of postoperative complications can enhance clinical strategies. Previous studies indicate varying rates of hypocalcaemia among Pakistani cohorts, influenced by nutritional deficiencies, patient demographics, and surgical practices (8, 12). Addressing these issues is vital for improving patient outcomes and optimizing healthcare resource utilization.

Moreover, cultural beliefs and socioeconomic factors in Pakistan may influence patient adherence to preoperative preparations and postoperative follow-ups, directly impacting overall outcomes following thyroid surgeries. The specific nutritional deficiencies in the population, particularly concerning vitamin D and calcium, underscore the need for tailored preoperative assessments and interventions, aligning with global recommendations in contemporary surgical practice [9, 13]. In summary, comprehensive studies investigating the frequency and underlying factors of hypocalcaemia in patients undergoing total thyroidectomy within the Pakistani context are critical for enhancing surgical care and improving patient outcomes.

**Methodology**

The present study was designed as a descriptive case series and conducted in the Department of General Surgery and Surgical Oncology, Sheikh Zayed Hospital, Lahore. The study was from December 16, 2024, to May 15, 2025, after approval from the College of Physicians and Surgeons Pakistan (CPSP) and the local institutional review board. The sample size was calculated using the WHO sample size calculator version 1.1, with a 95% confidence interval, an anticipated population proportion of 65% for post-thyroidectomy hypocalcaemia, and an absolute precision of 0.1, resulting in 88 participants. A non-probability consecutive sampling technique was employed to recruit eligible patients.

Patients were considered for enrollment if they were older than 18 years, had FNAC-proven thyroid swelling, were euthyroid preoperatively, and were planned for total thyroidectomy with complete removal of thyroid tissue. Patients with recurrent thyroid swellings, preoperative hypocalcaemia, or those unable or unwilling to comply with the study protocol were excluded. Informed written consent was obtained from all participants, and confidentiality was maintained throughout the research process. All surgical procedures were performed under the supervision of trained consultants, following standardized surgical guidelines to minimize procedural bias.

Data were collected using a predesigned proforma, recording demographic variables such as age, gender, thyroid swelling size, and clinical and laboratory parameters. Preoperative serum calcium levels were obtained for all patients to ensure normocalcaemia at baseline. Postoperative serum calcium levels were measured at 12 hours and 48 hours after surgery. For patients with normal calcium levels at 48 hours, an additional measurement was taken on the fifth postoperative day. Hypocalcaemia was operationally defined as a corrected serum calcium level less than 2.1 mmol/L (8.8 mg/dl) within five days following surgery. All data were entered into SPSS version 20.0 for analysis. Continuous variables, including age, thyroid swelling size, and serum calcium levels, were expressed as mean ± standard deviation. The normality of data distribution was checked using the Shapiro–Wilk test, and in case of non-normal distribution, median and interquartile ranges were reported. Categorical variables, such as gender and hypocalcaemia status, were presented as frequencies and percentages. The overall frequency of hypocalcaemia was calculated, and data were stratified by age and gender to identify potential effect modifiers. Post-stratification, the chi-square test was applied, and a p-value of ≤0.05 was considered statistically significant.

**Results**

A total of 88 patients who underwent total thyroidectomy were included in this study, conducted at the General Surgery and Surgical Oncology Unit, Sheikh Zayed Hospital, Lahore. The mean age of patients was 42.6 ± 11.8 years (range 19–68 years). Most participants were females, reflecting the higher prevalence of thyroid disorders among women in the Pakistani population. Most patients were between 18 and 60 years of age, with a marked female predominance (75%). The average thyroid swelling size was 5.2 cm. (Table 1).

Table 2 illustrates the mean serum calcium levels at different time points. The mean pre-operative calcium was 2.34 ± 0.12 mmol/L. A notable decline was observed at 24 hours post-operation, where the mean calcium dropped to 2.05 ± 0.18 mmol/L. This further decreased to 2.00 ± 0.21 mmol/L at 48 hours post-operation. By the fifth post-operative day, a slight recovery in calcium levels was observed (2.07 ± 0.16 mmol/L), though levels remained lower than the pre-operative baseline. This trend highlights the acute postoperative fall in calcium, followed by partial stabilization. (Figure 1).

Table 3 reports the frequency of post-thyroidectomy hypocalcaemia. Out of 88 patients, 30 (34.1%) developed hypocalcaemia, while 58 (65.9%) did not. This indicates that approximately one-third of patients experienced biochemical evidence of hypocalcaemia following thyroidectomy. (Figure 2).

Table 4 demonstrates the association of hypocalcaemia with age and gender. The occurrence of hypocalcaemia was relatively consistent across different age groups: 43.3% in patients aged 18–40 years, 40.0% in those aged 41–60 years, and 16.7% in patients above 60 years. The statistical analysis revealed no significant association between age and hypocalcaemia (p = 0.98). Similarly, while hypocalcaemia was slightly more frequent in females (80.0%) compared to males (20.0%), this difference was not statistically significant (p = 0.47).

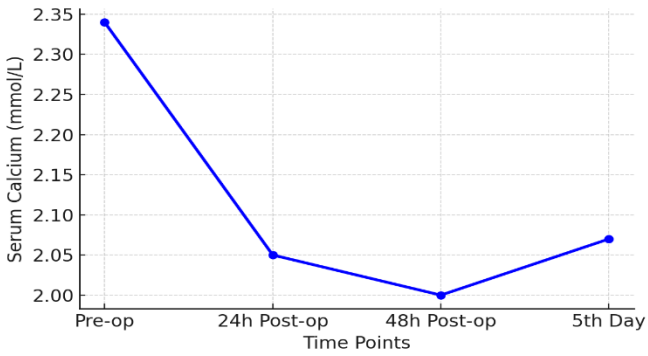


**Figure 1: Mean Serum Calcium Levels Over Time**

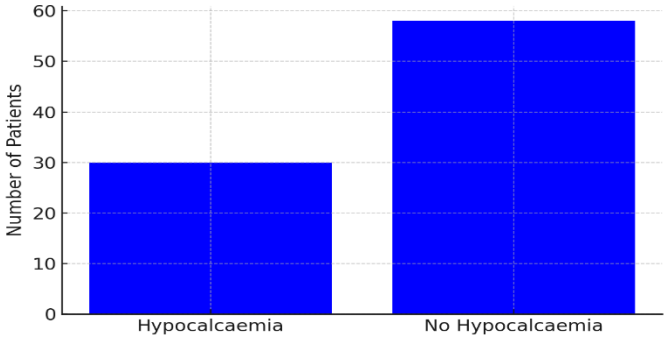


**Figure 2: Frequency of post-thyroidectomy Hypocalcaemia**.

**Table 1. Demographic distribution of study participants (n=88)**

| Variable | Frequency (n) | Percentage (%) | Mean ± SD |
|---|---|---|---|
| Age (years) | | | 42.6 ± 11.8 |
| 18–40 years | 38 | 43.2 | |
| 41–60 years | 37 | 42.0 | |
| >60 years | 13 | 14.8 | |
| Gender | | | |
| Male | 22 | 25.0 | |
| Female | 66 | 75.0 | |
| Size of thyroid swelling (cm) | | | 5.2 ± 1.6 |

**Table 2. Mean serum calcium levels at different time points**

| Time Point | Mean ± SD (mmol/L) |
|---|---|
| Pre-operative | 2.34 ± 0.12 |
| 24 hours post-op | 2.05 ± 0.18 |
| 48 hours post-op | 2.00 ± 0.21 |
| 5th post-op day | 2.07 ± 0.16 |

**Table 3. Frequency of post-thyroidectomy hypocalcaemia**

| Outcome | Frequency (n) | Percentage (%) |
|---|---|---|
| Hypocalcaemia present | 30 | 34.1 |
| Hypocalcaemia absent | 58 | 65.9 |

**Table 4. Association of hypocalcaemia with age and gender**

| Variable | Hypocalcaemia Present (n=30) | Hypocalcaemia Absent (n=58) | P-value |
|---|---|---|---|
| Age groups | | | |
| 18–40 years | 13 (43.3%) | 25 (43.1%) | 0.98 |
| 41–60 years | 12 (40.0%) | 25 (43.1%) | |
| >60 years | 5 (16.7%) | 8 (13.8%) | |
| Gender | | | |
| Male | 6 (20.0%) | 16 (27.6%) | 0.47 |
| Female | 24 (80.0%) | 42 (72.4%) | |

## Discussion

The results observed in our study of 88 patients undergoing total thyroidectomy offer significant insights into the prevalence of hypocalcaemia within the postoperative period. Our findings indicate that 34.1% of patients experienced hypocalcaemia following surgery, with a notable decline in mean serum calcium levels from a pre-operative mean of 2.34 ± 0.12 mmol/L to 2.05 ± 0.18 mmol/L at 24 hours post-operation, and 2.00 ± 0.21 mmol/L at 48 hours. This pattern correlates with the existing literature, which consistently illustrates postoperative hypocalcaemia as a prevalent complication following total thyroidectomy. The demographic characteristics of our cohort reflected a mean age of 42.6 years, predominantly consisting of female patients (75%). This aligns with studies by Gharib et al. Moreover, Ghafoor et al. emphasize the higher incidence of thyroid disorders in females due to potential endocrine, genetic, or environmental factors (14, 15). Furthermore, the relatively consistent occurrence of hypocalcaemia across age demographics, with 43.3% in the younger cohort (18-40 years) and diminishing to 16.7% in those over 60, did not yield significance ($p = 0.98$). This statistical lack of association corroborates findings from Atikuzzaman et al., who noted that age did not significantly correlate with hypocalcaemia (16). Our study's trend of serum calcium levels suggests an acute postoperative drop, which is well-documented in multiple analyses—for instance, researchers such as Islam et al. Similar reductions highlighted that PTH suppression during surgery can lead to transient hypocalcaemia, consistent with our findings of diminished calcium levels postoperatively (17, 18). By the fifth postoperative day, our data demonstrated a slight recovery (2.07 ± 0.16 mmol/L). Still, they remained under pre-operative values, indicating the importance of monitoring and appropriately managing calcium levels post-surgery, as emphasized by Farooq et al. (19). The observed hypocalcaemia prevalence of 34.1% aligns with various studies that report rates ranging from 15% to over 50%, depending on factors such as surgical technique and the presence of bilateral neck dissection (20, 21). For example, El-Maraghy et al. reported similar rates, noting that transient hypoparathyroidism leading to hypocalcaemia occurs frequently and can affect postoperative recovery (22). The significant percentage of patients in our study who developed biochemical hypocalcaemia post-thyroidectomy underscores the need for standardized protocols for postoperative monitoring and intervention. Our analysis revealed a higher frequency of hypocalcaemia in females (80%) compared to males (20%), although this did not reach statistical significance ($p = 0.47$). This finding is consistent with the literature that notes a predisposition for females to experience hypocalcaemia post-thyroidectomy, a trend corroborated by investigations such as those by Ahmad et al., who discussed female patients demonstrating a higher incidence of complications following surgical interventions for thyroid conditions (23, 24). The gender disparity in thyroid disease prevalence and surgical and hormonal variables may elucidate this phenomenon. The context of our study is important in understanding the unique implications for the Pakistani population. Thyroid disorders are notably prevalent in Pakistan, compounded by dietary deficiencies like Vitamin D and calcium, which are likely to affect postoperative outcomes and recovery (25). Addressing these nutritional deficiencies preoperatively could be vital in optimizing patient conditions for surgery and limiting postoperative hypocalcaemia. Furthermore, our study highlights the necessity of utilizing tailored approaches to patient management post-thyroidectomy in Pakistan, where public health initiatives may need to address the nutritional and educational gaps about thyroid health and surgical recovery.

Overall, our study's findings are consistent with the broader literature regarding the challenges and outcomes associated with total thyroidectomy, particularly concerning hypocalcaemia. Continuous efforts to improve surgical techniques, patient education, and nutritional management before and after surgery will be crucial in minimizing complications and enhancing recovery.

## Conclusion

This study demonstrated that hypocalcaemia is a common complication of total thyroidectomy, affecting about one-third of patients in a tertiary care hospital in Pakistan. Although no significant association with age or gender was observed, the consistent postoperative decline in serum calcium underscores the importance of vigilant monitoring. Implementing standardized surgical techniques, addressing preoperative nutritional deficiencies, and providing timely calcium and vitamin D supplementation can substantially reduce morbidity and improve patient recovery in resource-limited settings.

## Declarations

### Data Availability statement

All data generated or analysed during the study are included in the manuscript.

**Ethics approval and consent to participate**

Approved by the department concerned. (IRBEC-24)

**Consent for publication**

Approved

**Funding**

Not applicable

**Conflict of interest**

The authors declared the absence of a conflict of interest.

**Author Contribution**

**TM** (Resident (PGY4**)**
*Manuscript drafting, Study Design,*
*Review of Literature, Data entry, Data analysis, and article drafting.*
**MIA** (HOD)
*Conception of Study, Development of Research Methodology Design, Study Design, manuscript review, and critical input.*

*All authors reviewed the results and approved the final version of the manuscript. They are also accountable for the integrity of the study.*

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