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Frequency of Post-Thyroidectomy Hypoparathyroidism in Surgical Patients

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ABSTRACT

The risk of post-operative hypoparathyroidism is increased after thyroidectomy. It can be transient or permanent, potentially leading to severe neuromuscular and respiratory complications. **Objectives:** To identify postoperative hypoparathyroidism based on serum post-thyroidectomy hypoparathyroidism (PTH) levels after total thyroidectomy. **Methods:** This was a cross-sectional study, conducted after total thyroidectomy on 88 participants at the Department of Surgery, Niazi Welfare Foundation Teaching Hospital, Sargodha, from 1st October, 2024 to 30th November, 2025. Patients with an age range of 22 to 62 years undergoing total thyroidectomy were included in this study, while others with hyperparathyroidism, a history of neck radiotherapy, preoperative hypocalcemia, or preoperative suspicion of malignancy were excluded. A predesigned form was used to collect data regarding demographics, personal habits, comorbidities, reasons for performing total thyroidectomy, and postoperative hypoparathyroidism. Serum PTH level of <10 pg/ml was marked as diagnostic criteria for postoperative hypoparathyroidism. SPSS version 26.0 was used to analyze data. **Results:** In this Study, out of 88 participants, there were 25 male patients and 63 females. The patients' ages ranged from 22 to 62 years, with a mean age of 40.56 ± 8.23 years. 30 participants belong to the age group of 22-42 years, whereas 58 participants were in the age range of 43 to 62 years. Post-operative hypoparathyroidism was revealed in 19 (21.59%) participants. **Conclusions:** Postoperative hypoparathyroidism was observed in the majority of patients after total thyroidectomy.

INTRODUCTION

Thyroid surgery is a commonly performed and generally safe procedure used to treat various benign as well as malignant disorders. However, it carries risks of hemorrhage, laryngeal nerve injury, and, potentially leading to voice changes or airway obstruction—infection, hypothyroidism, and hypoparathyroidism (HPT) [1]. The most frequent surgical procedure leading to hypoparathyroidism is total thyroidectomy [2]. HPT results from parathyroid gland dysfunction caused by damage, inadvertent removal, or devascularization of parathyroid glands in the surgical process [3]. Hypoparathyroidism is also considered a major complication of neck surgeries, especially those involving the anterior triangle. Approximately 75% cases of anterior neck surgery progress to acquired hypoparathyroidism [4]. Postoperative hypoparathyroidism may be transient or permanent [5, 6]. Many patients who experience immediate postoperative hypoparathyroidism are classified as transient cases [7]. However, if normal function is not restored within six months, the condition is classified as permanent hypoparathyroidism [8]. Transient hypoparathyroidism risk after thyroid surgery ranges from

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6.9% to 46% and, 0.4% to 33% of cases progress to permanent hypoparathyroidism [9]. Certain thyroid conditions, like thyrotoxicosis, Graves' disease, thyroid carcinoma, and recurrent goiter, are related with an increased risk of both transient and permanent postoperative hypoparathyroidism [10]. Additional risk factors include low preoperative calcium levels, failure to identify all parathyroid glands during surgery, and parathyroid auto-transplantation [11]. 1.7% to 68% thyroidectomy cases present with postoperative hypocalcemia due to hypoparathyroidism and manifest as elevated or high-normal serum phosphorus levels, potentially leading to severe neuromuscular and respiratory complications [12]. The clinical manifestations of hypoparathyroidism vary in severity, ranging from tingling sensations to paresthesia, and muscle cramps leading to tetany, abnormal cardiac rhythms, seizures, cardiac failure, and laryngospasm [13]. The incidence of hypoparathyroidism has significantly declined due to improved anatomical knowledge and the presence of specialized endocrine units with high case volumes and experienced professionals. The occurrence of permanent hypoparathyroidism following thyroid surgery ranges from 0.9% to 1.6% [14].

Limited data are available on this research. So, this study doesn't work with a large sample size. As a result, a desire to establish whether the early postoperative serum parathyroid hormone (PTH) can be used as a reliable indicator of hypoparathyroidism in the immediate postoperative period in the situation of total thyroidectomy, particularly in cases where the sample sizes are small and surgical outcomes can be surgeon-dependent. Iatrogenic injury to the parathyroid glands or their blood supply is largely preventable when handled by skilled surgeons. This study aimed to identify postoperative hypoparathyroidism based on serum PTH levels after total thyroidectomy.

METHODS

A cross-sectional study was done during the period of 1st October, 2024 to 30th November, 2025 at the Department of Surgery, Niazi Welfare Foundation Teaching Hospital (NWFTH), Sargodha, after taking ethical approval letter (NM&DC-IRB-96) from the Institutional Review Board (IRB) committee having Ref No: IRB/NM&DC/598. Data collection was done after informed consent from patients and attendants. Sample size was calculated on open Epi software with the data of post-operative hypoparathyroidism from a previous research study [15] using 95% confidence interval and 7% margin of error, and the calculated sample size of the study was 88. A non-probability convenience sampling was utilized to collect data from study participants. Patients with an age range of 22 to 62 years undergoing total thyroidectomy were included in this study. An exclusion criterion was patients with hyperparathyroidism, a history of neck radiotherapy, preoperative hypocalcemia, or preoperative suspicion of malignancy. A predesign form was used to document preoperative history pertaining to patients' demographics, physical examination findings, thyroid function test, lab investigation including PTH and serum calcium levels, and ultrasound result of thyroid gland. Total thyroidectomy was done through the capsular dissection technique by experienced surgeons specialized in thyroid surgery. Consultants performed the procedure with careful identification and preservation of the parathyroid glands along with their vascular supply. After 2 days of total thyroidectomy, patients' PTH levels were again investigated to compare pre- and post-data, and serum PTH level of <10 pg/ml was marked as diagnostic criteria for postoperative hypoparathyroidism [16].

The data were gathered and processed in SPSS 26.0. Frequencies and percentages were determined in qualitative variables, whereas means and standard deviation (SD) were used to determine the quantity of the qualitative variables in the quantitative variables. Fisher's exact test was applied to see the gender and age-wise distribution of hypoparathyroidism post-operatively at a significance level of <0.05.

RESULTS

Eighty-eight patients were referred for a total thyroidectomy. A total of 88 patients (25 men and 63 women) were subjects in this study. The age of the patients was varied between 22 and 62 years, with a mean age of 40.56 and a standard deviation of 8.23 years. 30 patients were in the age group of 22-42 years, and 58 patients were in the age group of 43-62 years. In study participants, mean BMI was 26.77 ± 3.48 Kg/m^2, height was 155.4 ± 8.46 cm, and weight was 72.2 ± 10.23 Kg (Table 1).

Table 1: Demographics of Study Participants

Variables	n	Mean ± SD
Gender		
Male	25	–
Female	63	
Age in Years		
22-42	30	40.56 ± 8.23
43-62	58	
Others		
BMI (kg/m^2)	–	26.77 ± 3.48
Height (cm)	–	155.4 ± 8.46
Weight (kg)	–	72.2 ± 10.23

Post-operative hypo-parathyroidism was revealed in 19(21.59%) participants. Gender distribution depicted that out of 25 male participants, hypo-parathyroidism was

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evident in 9 patients, while 10 females were identified as having PTH <10pg/ml. According to age category,12 patients in the age group 22-42 years had PTH levels less than 10pg/ml, and similarly 7 patients of hypoparathyroidism were in the age group of 43-62 years. Mean pre- and post-operatively PTH levels were 25.76 ± 9.78 and 16.78 ± 2.34, respectively (Table 2).

Table 2: Age- and Gender-Based Categorization of Hypoparathyroidism in the Participants

Characteristics	Hypoparathyroidism (PTH<10pg/ml)		p-value
	Yes	No	
Gender			
Male	9	16	0.040
Female	10	53	
Age (Years)			
22-42	12	18	0.005
43-62	7	51	

DISCUSSION

The surgery of benign multinodular diseases was still an issue of debate over the years particularly to determine whether the option of total thyroidectomy or near-total thyroidectomy should be regarded as a gold standard. Thyroid surgery carries the risk of hypoparathyroidism (parathyroid insufficiency) and recurrent laryngeal nerve damage [7]. Both can significantly impact the quality of life and strain healthcare resources. Hypoparathyroidism after thyroid surgery is less common in hospitals with specialized thyroid units, but it does tend to occur more frequently in older women [17, 18]. This study found a 21.59% rate of hypoparathyroidism, which can be attributed to surgical trauma to the gland, resulting in postoperative hypoparathyroidism. A Pakistani study showed a much higher rate (47.5%) of hypoparathyroidism after total thyroidectomy [19]. Additionally, one study found no significant difference in PTH levels during and immediately after thyroidectomy [20]. These findings align with the results of the current study. Similarly, a prospective study reported 17.2% hypoparathyroidism cases after total thyroidectomy [21]. Another study found that the incidence of transient hypoparathyroidism was also found to be highly increased in the total thyroidectomy (TT) group, which is in line with the results of the study [8]. On the same note, a different study has noted a reduced incidence of hypoparathyroidism among patients undergoing near-total thyroidectomy than those undergoing total thyroidectomy [17]. Akgun et al. also reported hypoparathyroidism cases following total thyroidectomy, particularly when combined with radical neck dissection. These findings are consistent with the results of the study [22].

This study was conducted at a single center with a limited sample size and short follow-up, which restricts the generalizability of the findings. Additionally, it focused solely on immediate postoperative outcomes. Future research should include multicenter follow-up studies with larger sample sizes to enhance the applicability of the results. Although the study offers valuable insights for improving postoperative management in patients undergoing total thyroidectomy.

CONCLUSIONS

The study reveals that postoperative hypoparathyroidism is a serious and potentially life-threatening outcome after total thyroidectomy. The early recognition using PTH levels is crucial for minimizing the risk of hypoparathyroidism in clinical practice.

Authors' Contribution

Conceptualization: HS
Methodology: HS, HAA, NM, MS
Formal analysis: AHK, TBQ
Writing and Drafting: HAA, KAR
Review and Editing: HS, HAA, AHK, KAR, NM, MS, TBQ

All authors approved the final manuscript and take responsibility for the integrity of the work.

Conflicts of Interest

All the authors declare no conflict of interest.

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