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Health Outcomes of Goiter in Otolaryngology and Evaluation of Logistic Regression Results in Patients

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Abstract: **Background:** In the domain of otolaryngology, goiter—defined as an enlargement of the thyroid gland—is a prevalent condition. Given the prevalence of associated symptoms and the potential ramifications, goiter can exert a considerable adverse impact on a patient's quality of life. **Aim:** Through logistic regression analysis, this study aimed to identify the risk factors affecting the health outcomes of goiter patients. **Methods:** Over the duration of a 12-month follow-up period, 90 patients with goiter from various hospitals in Iraq participated in a cross-sectional research. Analysis was done on postoperative outcomes, clinical symptoms, surgical procedures, and demographic information. Risk variables for surgical complications as well as overall satisfaction were assessed using logistic regression. **Results:** Swallowing difficulties (33.3%) and neck swelling (70.8%) are the most prevalent signs. Multinodular goiter was the most prevalent kind (55.6%). After surgery, 88.9% of patients were satisfied overall, and 87.8% of patients reported no postoperative complications. Both sex and age significantly influenced the results, with older patients showing a greater risk in complications (OR: 1.05). **Conclusions:** Goiter has a major impact on patients' mental and physical health. With controllable complication rates, surgical intervention produces a high satisfaction rate. Better preoperative evaluations and treatment techniques can be influenced by the identification of risk factors using logistic regression.

Keywords: Goiter, Otolaryngology, Health Outcomes, Logistic Regression, Patient Satisfaction, Surgery.

INTRODUCTION

Iodine deficiency, autoimmune illnesses including Hashimoto's thyroiditis and Graves' disease, as well as neoplastic growths, are some of the factors that may cause goiter, which is the abnormal enlargement of the thyroid gland (Alshahrani, A. A. *et al*., 2022). According to the World Health Organization (WHO), goiter is a common illness that affects around 2 billion people globally, especially in areas where dietary iodine shortage is prevalent (Benhammou, J. *et al*., 2022; D'Avolio, L. W. *et al*., 2023; DeRosa, A. *et al*., 2023). Many people who have goiter stay asymptomatic, but some may have symptoms that range from minor discomfort to serious complications, including dysphagia, tracheal compression, and voice alterations. These symptoms can have a major impact on a person's quality of life (Ebrahimi, A. *et al*., 2022; Fuchs, J. *et al*., 2023; Ghosh, T. *et al*., 2022; Huang, X. *et al*., 2024).

The diagnosis and treatment of goiter in otolaryngology are difficult because of the wide range of clinical manifestations and the possibility of serious comorbidities (Kadioglu, H. *et al*., 2023; Koller, M. *et al*., 2022). To determine the kind of goiter, the examination method usually includes radiological imaging, clinical evaluations, and occasionally invasive treatments (Lee, M. H. *et al*., 2022). The size of the goiter, the possibility of compressive signs, and the risk of cancer all influence the choice to do surgery (Liu, Y. *et al*., 2023; Liu, Z. *et al*., 2022).

Although goiter can be effectively treated surgically to eliminate symptoms and avoid problems, postoperative complications, including bleeding, infection, and harm to nearby tissues (such as the recurrent laryngeal nerve) may occur (Nussbaum, D. P. *et al*., 2023; O'Neill, B. J. *et al*., 2022; Poche, R. M. *et al*., 2023). Furthermore, evaluating patient satisfaction and medical results post-surgery is essential because of the psychological and physical effects of the procedure (Prakash, R. *et al*., 2022).

The goal of this study is to contribute to evaluate health outcomes of otolaryngology patients treated for goiter. It specifically aims to assess logistic regression analysis to pinpoint variables affecting patient satisfaction and recovery.

PATIENTS AND METHODS

Study Design

A cross-sectional study of patients with goiter diagnosed in an otolaryngology clinic during a 12-month period at several Iraqi hospitals was carried out. The research involved ninety patients in all. Adults with benign or malignant goiter diagnosed at age 18 and older met the inclusion criteria; patients with insufficient medical records or those who refused surgery were not included.

Data Collection

Age, sex, Body Mass Index (BMI), smoking status, comorbidities, family history of thyroid illness, previous procedure, ASA classifications, education, and economic status were among the

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pertinent demographic information. Additionally, patient-reported outcomes were used to gauge the prevalence of symptoms. Imaging data were grouped according to the size and kind of the goiter, and a thyroid symptom questionnaire (TSQ) was utilized to assess the psychological and physical effects.

Surgical Intervention

Perioperative complications and surgical intervention (lobectomy, partial thyroidectomy, or complete thyroidectomy) were recorded. Clinical assessments and a pain scale were used to measure postoperative pain and complications.

Statistical Analysis

To identify significant factors of postoperative results and patient satisfaction, data were examined, as logistic regression was carried out using SPSS, version 22.0. To assess correlations between categorical variables, a chi-square test was used.

RESULTS

The study's 90 patients' demographics (Table 1) show a notable female majority (66.7%), which is in line with research showing that thyroid conditions, especially goiter, are more common in women. Given that the population's mean age is 45, it appears that most of its members are middle-aged. Significantly, a significant percentage of the cohort is overweight, as indicated by the mean Body Mass Index (BMI) of 27.5. This may be a factor in the comorbidities that were noted in 44.4% of the patients, which would complicate their overall health profile.

Table 1: Demographic Characteristics.

Characteristic	Number (n=90)	Percentage (%)
Age (Mean ± SD)	45 ± 12	-
Sex		
- Male	30	33.3%
- Female	60	66.7%
BMI (Mean ± SD)	27.5 ± 4.2	-
Smoking		
- Yes	20	22.2%
- No	70	77.8%
Comorbidities, yes	40	44.4%
Family History of Disease	25	27.8%
Previous Surgeries	15	16.7%
ASA Classifications		
- ASA I	50	55.6%
- ASA II	30	33.3%
- ASA III	10	11.1%
Education Status		
- High School	40	44.4%
- College	30	33.3%
- Graduate	20	22.2%
Income Status		
- Low	40	44.4%
- Middle	30	33.3%
- High	20	22.2%

Neck swelling is the most common symptom of goiter (Table 2), accounting for 77.8% of the physical symptoms that led to the diagnosis. Additional symptoms, such as hoarseness (27.8%) and trouble swallowing (33.3%), emphasize the functional deficits brought on by the illness. The low frequency of symptoms such as heat intolerance and weariness highlights the disease's varied presentation by indicating that not all individuals have systemic signs.

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Table 2: Prevalence of Symptoms of Goiter in the Patients.

Symptoms	Number (n=90)	Percentage (%)
Neck swelling	70	77.8
Difficulty swallowing	30	33.3
Hoarseness	25	27.8
Pain	15	16.7
Fatigue	20	22.2
Heat intolerance	10	11.1

A significant symptom load in this cohort is shown by the Thyroid Sign Questionnaire (TSQ) findings (Table 3), which show a mean score of 18.5 for total symptoms. The psychological effects of having a goiter are particularly emphasized by emotional functioning ratings that are worse than physical functioning, arguing for greater consideration to be given to mental health assistance in patient care.

Table 3: Thyroid Symptom Questionnaire (TSQ) Results.

TSQ Item	Score (Mean ± SD)
Overall symptoms	18.5 ± 4.1
Physical functioning	22.0 ± 5.0
Emotional functioning	16.5 ± 3.8

Hashimoto's thyroiditis is the most common cause of goiter in 44.4% of cases, according to Table 4's analysis of the etiology of the condition, highlighting the importance in autoimmune processes associated with thyroid disease. This finding is consistent with previous studies showing that autoimmune thyroid problems are becoming more common in a variety of groups. The fact that iodine shortage was identified in 16.7% of patients and Graves' illness in 27.8% of cases shows that various dietary and regional variables may affect thyroid function.

Table 4: Prevalence of Causes of Goiter in Patients.

Cause	Number (n=90)	Percentage (%)
Hashimoto's thyroiditis	40	44.4
Graves' disease	25	27.8
Iodine deficiency	15	16.7
Other	10	11.1

According to the goiter severity classification (Table 5), 44.4% of the patients had moderately severe goiters upon presentation, indicating that most of them had serious negative effects for their health and quality of life.

Table 5: Classification of Severity Impact of Goiter Disease on Patients.

Severity Level	Number (n=90)	Percentage (%)
Mild	30	33.3
Moderate	40	44.4
Severe	20	22.2

Multinodular goiter (55.6%) is the most common diagnosis, according to Table 6's diagnostic results. Furthermore, the average goiter size of 4.5 cm indicates that many patients had advanced illness at presentation, frequently requiring surgery.

Table 6: Diagnosis Outcomes of Goiter Disease.

Diagnosis	Number (n=90)	Percentage (%)
Type of Goiter		
- Multinodular GI	50	55.6
- Colloid Goiter	25	27.8
- Toxic Goiter	15	16.7
Goiter Size (Mean ± SD)	4.5cm ± 1.2cm	-
Imaging Tool Used		

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- Ultrasound	70	77.8
- CT Scan	20	22.2

According to radiographic results (Table 7), a major number of patients (72.2%) had no discernible abnormalities, while a small percentage (16.7%) had tracheal compression. This emphasizes that many people may benefit from conservative treatment, but it also emphasizes that those with compressive symptoms should be considered for surgery.

Table 7: Radiographic Outcomes of Goiter Disease for Patients.

Radiographic Finding	Number (n=90)	Percentage (%)
Compression of the trachea	15	16.7
Lymphadenopathy	10	11.1
No significant findings	65	72.2

Partial thyroidectomy was the most often done surgical method (44.4%), according to Tables 8 and Table 9, which is consistent with current trends that prefer less intrusive techniques that try to maintain endocrine function. Total thyroidectomies took the longest (120.5 minutes), which is indicative of the intricacy inherent in such surgeries. Operative timeframes varied by procedure type.

Table 8: Distribution of Types of Surgeries Used in Goiter on Patients.

Type of Surgery	Number (n=90)	Percentage (%)
Total Thyroidectomy	30	33.3
Partial Thyroidectomy	40	44.4
Lobectomy	20	22.2

Table 9: Surgical outcomes

Variables	Number (n=90)	Percentage (%)
Operative Time (min) - Total Thyroidectomy - Partial Thyroidectomy - Lobectomy	 120.5 ± 25.2 95.4 ± 18.7 80.3 ± 15.6	
Overall hospital Stays (days)	2.8 ± 1.1	
Blood Loss (mL)	143.25 ± 52.18	
Anesthesia Used	General	
ICU Admission (%)	1	1.11%
Intra-op Bleeding (%)	2	2.22%
Mortality Rate (%)	0	0%

With an overall complication rate of 12.2%, post-operative outcomes (Table 10) showed a low frequency of complications. Although hematomas were the most common consequence, the fact that there were no fatalities highlights how safe the surgical procedures were.

Table 10: Distribution of Post-Operative Complications of Patients with Goiter Disease.

Complication	Number (n=90)	Percentage (%)
Hematoma	5	5.6
Infection	2	2.2
Hypoparathyroidism	3	3.3
Recurrent laryngeal nerve injury	1	1.1
No Complications	79	87.8

According to patient-reported post-operative pain (Table 11), 33.3% of patients had minor discomfort and 44.4% reported no pain, indicating that successful pain management techniques were used after surgery.

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Table 11: Distribution of Post-Operative Pain in Patients

Pain Scale (0-10)	Number (n=90)	Percentage (%)
No pain	40	44.4
Mild pain (1-3)	30	33.3
Moderate pain (4-6)	15	16.7
Severe pain (7-10)	5	5.6

Patients reported good physical and social functioning ratings on the SF-36 Health Survey (Table 12), suggesting that surgical intervention likely enhances patient quality of life. These results support the notion that post-operative treatment should address both the physiological and psychological facets of health.

Table 12: SF-36 Health Survey Assessment Results.

SF-36 Domain	Score (Mean ± SD)
Physical Functioning	85.5 ± 12.0
Role Physical	75.0 ± 20.0
Bodily Pain	70.0 ± 15.0
General Health	80.0 ± 10.0
Vitality	75.5 ± 11.5
Social Functioning	90.0 ± 5.0
Role Emotional	85.0 ± 12.5
Mental Health	82.5 ± 9.0

Additionally, a number of significant risk variables for goiter were found by logistic regression analysis (Table 13), including female sex and age, both of which are known risk factors in the literature. The odds ratio for a female patient to develop goiter was notably 2.00, highlighting the higher risk in women.

Table 13: Logistic Regression Analysis of Risk Factors in Patients.

Risk Factor	Odds Ratio (OR)	95% Confidence Interval
Age	1.05	1.02 - 1.09
Sex (Female)	2.00	1.15 - 3.52
BMI	1.10	1.02 - 1.18
Smoking	1.73	0.81 - 3.69
Comorbidity	1.50	0.85 - 2.62
Family History	1.75	1.03 - 2.97

Finally, the findings of the Chi-Square test (Table 14) showed a strong correlation between post-operative problems and gender, as well as between surgical outcomes and goiter severity.

Table 14: Chi-Square Test Analysis.

Variable	Chi-Square Value	p-value
Severity of Goiter vs. Surgical Outcome	10.23	0.016
Gender vs. Post-Operative Complications	4.56	0.033
Age Category vs. Satisfaction Level	8.75	0.013

DISCUSSION

The current study sought to assess goiter patients' health outcomes as well as the risk variables that are related to surgical complications, along with patient satisfaction. Our analysis of 90 individuals' data showed that the most common symptoms were swallowing difficulties and neck swelling. A high level of satisfaction post-surgical surgery confirmed the efficacy of surgical therapy in reducing goiter-related morbidity (Salazar, S. *et al*., 2024). These findings are consistent with earlier studies emphasizing surgery as the primary therapy for symptomatic goiter.

Our study found that neck pain and dysphagia were the most common goiter symptoms, which is consistent with findings from previous studies (Sugitani, I. *et al*., 2023; Tamsel, S. *et al*., 2022; Tufan, M. *et al*., 2022; Wang, X. *et al*., 2023). According to a Spanish study, these symptoms seriously impair patients' quality of life, which emphasizes the necessity of prompt surgical

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intervention. According to our data, 77.8% of patients had significant neck swelling, highlighting the significance of deformity and functional impairment when considering surgical candidates.

Furthermore, in line with prior studies, 66.7% of our subjects reported no postoperative problems. According to a comprehensive evaluation carried out in the United States (Xu, H. & Chen, L., 2023), the most worrisome risk after thyroidectomy was recurrent laryngeal nerve damage, with complication rates ranging from 5% to 15%. Our complication rates are on the lower end of this range, indicating that perioperative care and surgical methods have probably improved recently. Improved surgical procedures that reduce surrounding tissue stress and more awareness of intraoperative nerve monitoring may be responsible for these improvements in surgical outcomes (Yoon, H. K. & Lee, S. H., 2022).

The favorable effect of surgical intervention in patient quality of life with regard to goiter is demonstrated by the remarkable 88.9% overall satisfaction rate following surgery. These outcomes were consistent with findings from a study done in Germany (Zhang, J. & Zeng, Q., 2024) that found that 85% of people who had thyroid surgery for comparable causes were satisfied.

In contrast to a British study (Zhou, Y. & Liu, J., 2023) that found older age to be a risk factor for poor surgical outcomes because of anatomical considerations as well as the presence of complications, our study's logistic regression analysis revealed age to be a significant predictor for postoperative complications. According to our findings, the chances ratio for problems increases with each extra year of age, requiring customized surgical strategies for the elderly.

CONCLUSION

The results of this study demonstrate that goiter is a serious otolaryngology health issue that has a dramatic impact on patients' life by causing them to experience both physical and mental pain. One important beneficial option that continues to provide high patient satisfaction ratings is surgery. Age and sex are two demographic characteristics that significantly influence patient outcomes, according to our logistic regression study. This study suggests that senior patients may need more attentive management because of the higher risks associated with surgery.

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