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Appraisal of Thyroidectomy in Outlying Tertiary Care Hospital

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Abstract- *Objective:* To find out the prevalence, presentation, disease patterns, operations of the thyroid gland and facilitate the prevention of complications and a risk factors for it.

Study design: Cohort retrospective study.

Setting: Academic tertiary care hospital.

Subject and Methods: A total of 173 euthyroid benign and malignant goiter patient's demographic data, diagnosis, operations, complications, and management options collection and analyzed who attended in the department of Otolaryngology and Head-Neck Surgery, Comilla Medical College, and Comilla Medical Centre, concern Clinic of Central Medical College, Comilla, Bangladesh from 01 July 2016 to 31 June 2019.

Results: Incidence of euthyroid benign and malignant Goiter among outpatient was 0.12%, and the yearly prevalence of 33.34%. Out of 173, the male was 20 (11.56%), and the female 153 (88.44%), 30-39 years patients have the highest presentation was 60 (88.44%), 20-29 years 40 (23.12%), and 40-49 years 38 (21.97%), euthyroid benign goiter was 142 (82.08%), and malignant 31 (17.92%).

Keywords: *hemithyroidectomy (HT), total thyroidectomy (TT), completion thyroidectomy (CT), selective neck dissection (SND), recurrent laryngeal nerve (RLN), hypoparathyroidism, RTL (rigid telescopic video laryngoscopy).*

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Conclusion: Thyroidectomy is a criterion procedure for surgeons. The surgeon should know the anatomy, pathology, various indications for optimal surgery, and postoperative complications to maintain the successful outcome of it, which is tough.

Keywords: hemithyroidectomy (HT), total thyroidectomy (TT), completion thyroidectomy (CT), selective neck dissection (SND), recurrent laryngeal nerve (RLN), hypoparathyroidism, RTL (rigid telescopic video laryngoscopy).

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I. Introduction

Goiter uses to describe as a generalized enlargement of the thyroid gland. Iodine deficiency is the leading cause of goiter in the world [1]. Goiter may be present from the third and fourth decade of life and may cause dysphagia and obstructive symptoms. In children, it may cause mental retardation and neonatal cretinism [2]. Nutritional International (NI) works with universal salt iodization in Bangladesh from 2000 and work is ongoing. The Wickham survey observed 15% of people existing with goiter in the iodine-exuberant area, and 7% of people attended with visible goiter [3]. Higher frequency of goiter found in women and the elderly [4]. Euthyroid glandular enlargement may be diffuse or nodular. The thyroid malignancy accounts for 1% of all other new malignancies [5]. Differentiated thyroid cancer papillary represents 72%-85%, and follicular 10-20% of all thyroid cancers, medullary 1.7-35%, anaplastic less than 1% and other carcinoma 1-4% [6]. Women are 5-10 times greater prevalence of nodular goiter, and cancer prevalence 1.5% in women, which comprises 0.5% in men [7]. The majority of patients remain asymptomatic, but sometime 30-80% patients may complain of dysphagia and dyspnoea [8]. Diagnosis of thyroid swelling confirmed by history, clinical examination and investigation, and even suspected cancer in some instances [9]. Initial laboratory investigation is FT_4, FT_3, and TSH of patients with thyroid swelling advocated by ATA and BTA [10]. Diagnostic imaging includes high-resolution ultrasonography (USG), CT, MRI in which USG routinely uses for evaluation of thyroid nodule [11]. FNAB or FNAC (Fine Needle Aspiration Biopsy or Cytology) is the gold-standard investigation to the diagnosis of benign or malignant nodular goiter except follicular adenoma with carcinoma due to capsular and vascular invasion depends on histological criteria, and allowing accurate cell collection through USG guidance [12]. Preoperative laryngeal examination by FOL or RTL should complete on all patients [13]. Upon the principles of Kocker's surgical technique, usually practiced surgery was hemithyroidectomy, near-total thyroidectomy or Dunhill's thyroidectomy (NTT), total thyroidectomy (TT) with or without neck dissection (ND) [14]. The leading complications of surgery are injury to the external branch of the superior laryngeal nerve (EBSLN), RLN, and the parathyroid glands [15] [16]

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[17]. Intraoperative neural monitoring (IONM) device is available in the developed country to save the nerve where it routinely used in total thyroidectomy and neck dissection [18]. If the parathyroid gland dissected, the sample collected and sent for frozen section analysis; if the parathyroid gland it should be implanted in sternomastoid muscle after sectioning it around 12 pieces [17].

II. Methods and Materials

The study performed in two tertiary care hospitals. During three years period, 116128 patients attended in the outpatient department of the Government Comilla Medical College Hospital and 33840 in the private Comilla Medical Centre, Comilla, an outlying city of Bangladesh. Out of 149968, euthyroid glandular thyroid patients were 173. All patients were clinically diagnosed as euthyroid benign and malignant thyroid swelling and confirmed by history, examination, and investigations such as thyroid function test, serum calcitonin, USG of the neck, FNAC, or FNAB, and RTL to ensure vocal cord mobility, CT scan, and MRI whichever were needed. The following information collected about the patients: Gender, age, personal history, presenting features, investigations, disease pattern and surgical options, postoperative complications, and management. Descriptive statistics used to calculate the data. Microsoft office 2007 used to cite figures and tables.

III. Results

Incidence among outpatient was 0.12% and yearly prevalence of 33.34%. Out of 173, the male was 20 (11.56%), and the female 153 (88.44%), 0-9 years patient was nil, 10-19 years were 06 (3.47%), 20-29 years 40 (23.12%), 30-39 years 60 (34.68%), 40-49 years 38 (21.97%), 50-59 years 19 (10.98%), 60-69 years 07 (4.05%), and above 70 years 03 (1.73%), age range 17-75 years, mean age 39.22 and the standard deviation 12.275. Personal history revealed patient from endemic zone was 57 (32.95%), non-endemic zone 116 (67.05%), smoker 29 (16.76%), non-smoker 144 (83,24%), diabetic 26 (15.03%), non-diabetic 147 (84.97%), hypertensive 33 (19.08%), non-hypertensive 140 (80.92%), and goitrogenic food habit like onions, carrots, sweet potato, radishes, cauliflower, cabbage, kale and turnips was 173 (100%). Presenting features showed asymptomatic invisible or visible swelling (40ml or greater size) was 173 (100%), dysphagia and dyspnoea 31(17.92%), difficulties to wear necklaces 23 (13.29%), signs of goiter according to WHO, grade o: impalpable/invisible was 00, grade 1a: palpable but invisible even in full extension 07 (4.05%), grade 1b: palpable in neutral position/ visible in extension 32 (18.50%), grade2: visible but no palpation require to make diagnosis 41(23.70%) and grade3: visible at a distance 93 (53.75%). The common investigation did for all patients: 1. Serum FT_3, FT_4, TSH, 2. Serum Calcitonin. 3. USG of thyroid gland and neck, USG guided FNAB whichever were needed. 4. FNAC, 5.CT scan or MRI, if needed; 6. RTL did to ensure normal vocal cord mobility. Disease pattern exhibited euthyroid benign goiter was 142 (82.24%), and malignant goiter 31(17.92%). Out of benign 142, nodular goiter was 104 (73.24%), multinodular goiter 25 (17.61%), and follicular adenoma 13 (9.15%). Among malignant 31, papillary carcinoma was 29 (93.54%), follicular carcinoma 01(3.23%), and medullary carcinoma 01 (3.23%). According to the 8th edition of AJCC, the staging of malignant tumor, stage-1 $T_1N_0M_0$ was 09 (29.03%), and $T_2N_0M_0$ 20 (64.51%), stage-2 $T_2N_1M_0$ was 01 (3.23%), and stage-3 $T_{4a}N_1M_0$ 01 (3.23%). The operation performed hemithyroidectomy was 136 (78.61%), total thyroidectomy 35 (20.23%), completion thyroidectomy 02 (1.16%), and selective neck dissection two, one with total thyroidectomy and another with completion thyroidectomy. Postoperative complications showed hemorrhage was 02 (1.16%), hematoma 05 (2.89%), wound infection 01(0.58%), keloid 01 (0.58%), RLN paralysis temporary/unilateral 35 (20.23%), permanent/bilateral paralysis 02 (1.16%), and temporary hypoparathyroidism 12 (6.93%). Management of complication exhibited 47 (81.03%) treated conservatively, and 11 (18.97%) surgically.

Hemorrhage after a thyroid surgery is medical emergency because it created tension hematoma of the neck, causing respiratory distress. The patient immediately transferred to operation theatre and removed all layers of the wound after stitch cutting-one patient's bleeding from a punctured anterior jugular vein and another from thyroid vein. We properly secured the bleeding point stitching by 2/0 vicryl. Five patients had a subcutaneous hematoma. We off one or two stitches, evacuate the collection and applied pressure bandage. One patient suffered wound infection, and we cut the stitch like hematoma, evacuate the pus, and change the antibiotic according to culture and sensitivity test. One patient came with a keloid on incision the line. We excised the keloid, and after wound healing, gave the Injection steroid in the lesion every fifteen days for three months. 35 unilateral RLN paralysis patients treated medically by steroid, multivitamin, and combination of B_1 (Thiamine), B_6 (Pyridoxin), and B_{12} (Cyanocobalamine). Thirty-two patients improved, and rest 03 gave Injection augmentation through the surgical procedure under general anesthesia. Two patients suffered bilateral RLN paralysis treated surgically by cordectomy. Temporary hypoparathyroidism diagnosed by Trousseau's sign or tetany. We added Tablet Rocal-D which contain calcium carbonate USP 1250 mg with equivalent to 500 elemental calcium, vitamin D_3 (cholecalciferol) USP 200 IU, two tablets three times daily, and Tab Sun D (Cholecalciferol) 1000 IU, one tablet two times daily after the postoperative period, and continued, for six months

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after the operation. If tetany sign continued we added Inj. Calcium Gluconate 50 ml in 500 ml normal saline eight hourly up to the tetany sign disappeared.

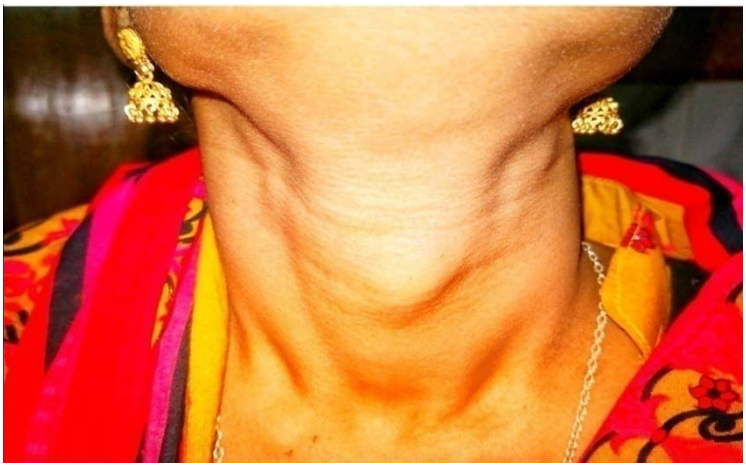


Figure-1: Nodular Goiter.



Figure-2: Multinodular (MNG) Goiter.



Figure-3: Papillary Carcinoma of thyroid.

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Figure-4: Follicular carcinoma of thyroid.

Table-1: Disease pattern and operations performed.

Serial	Disease	Number of patient	percentage	HT Right	HT Left	CT	TT	SND
1.	Benign Goiter	142	82.08%	00	00	00	00	00
1.1	Nodular	104	73..24%	63	41	00	00	00
1.2	MNG	25	17.61%	09	05	00	11	00
1.3	Follicular Adenoma	13	9.15%	06	07			
2.	Malignant Goiter	31	17.92%	00	00	00	00	00
2.1	Papillary carcinoma	29	93.54%	02	03	02	22	02
2.2	Follicular carcinoma	01	3.23%	00	00	00	01	00
2.3	Medullary carcinoma	01	3.23%	00	00	00	01	00
Total		173	100%	80	56	02	35	02

Table-2: Postoperative complications.

Serial	Complication	HT	TT+-SND	CT+-SND	Total	Percentage
1.	Hemorrhage	01	01	00	02	1.16%
2.	Hematoma	03	02	00	05	2.89%
3.	Wound infection	00	01	00	01	0.58%
4.	Keloid	01	00	00	01	0.58%
5.	RLN paralysis					
5.1	Temporary/ Unilateral	20	15	00	35	20.23%
5.2	Permanent/ Bilateral	00	01	O1	02	1.16%
5.3	Total	20	16	01	37	21.39%
6	Hyoparathyroidism					
6.1	Temporary	00	11	01	12	6.93%
6.2	Permanent	00	00	00	00	00
Total		25	31	02	58	33.53%

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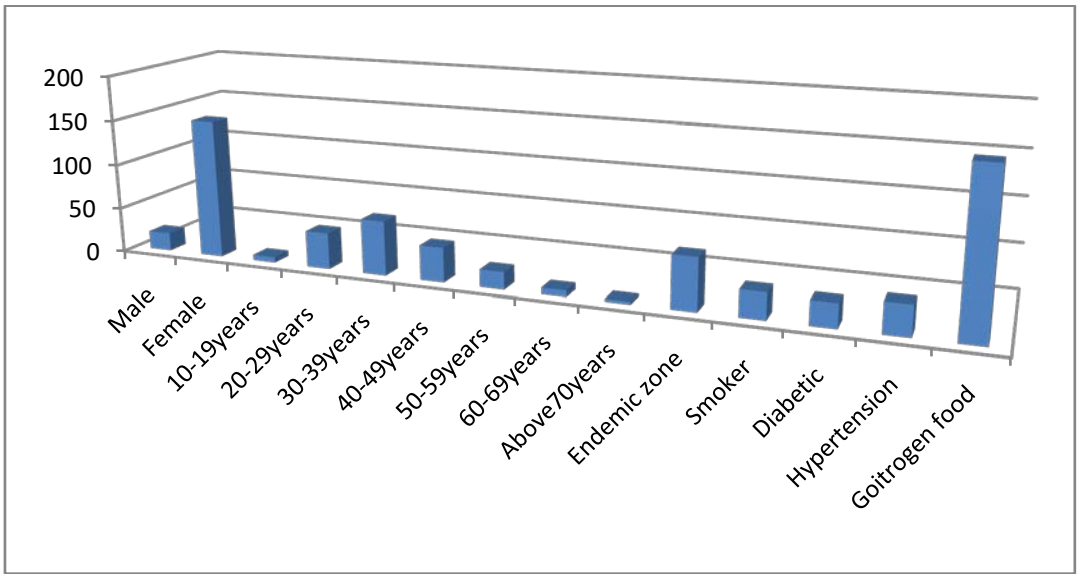


Figure-5: 1. Gender epidemiology. 2. Age distribution. 3. Personal history.

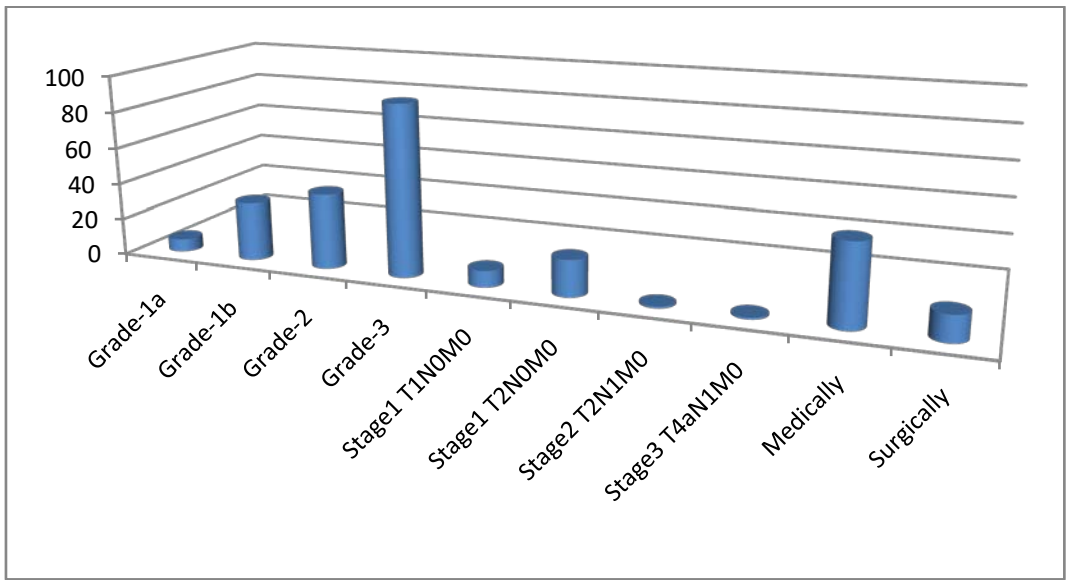


Figure-6: 1. Presenting feature according to WHO. 2. Staging of Malignant tumor by AJCC 8th edition. 3. Management of complications.

IV. Discussion

Goiter or thyroid swelling is mention when it exceeds the normal volume, which is 25 ml for men and 18 ml for women. The incidence of thyroid swelling among outpatient in our study was 0.12%, and the yearly prevalence of 33.34%. Ansar MAJ reported clinically evident thyroid prevalence was 10%, and subclinical hypo and hyperthyroidism was 10%, total 20% prevalence in Bangladesh, which is near to our work [19]. Weigle et al. also described 3.95% of Indian people suffering from thyroid origin disease, which is near to all Asian countries like Bangladesh [20]. Volzke et al. study showed that the prevalence was 35.9% in the endemic iodine deficiency area than the non-endemic area consistent with our research [21].

Considering gender epidemiology, females were predominant in our study showed females, males ratio has gaps in 7.65: 1 supported by Altaf et al. study represented 5.49:1 female, male ratio, and Vanderpump MPJ study reported a higher prevalence in females [22] [23]. Hegedus et al. work also held up our result exhibited frequency higher in the elderly and female [4]. Hu et al. study showed female, the male ratio was 6.79: 1carried out of our paper [24].

Regarding age, in our work displayed maximum age incidence was 3rd to 5th decade, age range 17-75 years and mean age 39.22 years consistent with Rajkhowa et al. series, reported maximum age incidence was 3rd to 4th decade [25]. Hu et al. study showed the mean age was 52 years and the age range 9-87 years against our presentation [24].

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About personal history, in the present study, 32.95% of patient came from iodine-deficient endemic zone, which was the most common cause of hypothyroidism and goiter worldwide supported by Delange et al. [26]. 100% of patient in our series had goitrogenic food habits contain thiocyanate, drugs such as paraaminosalicylic (PAS) acid and antithyroid drugs interfere with the oxidation of iodide and binding of iodine to tyrosin. A large amount of iodides are goitrogenic [27]. Smoker (29), diabetic (26), and hypertensive (33) patients need and gave especial attention during anesthesia, operation, and postoperative period.

The presenting features are important for preoperative assessment and giving the proper direction on how to approach the surgical procedure supported by Chen et al. study [28]. The present study showed asymptomatic invisible or visible swelling was 100%, dysphagia, and dyspnoea 17.92%, and difficulty to wear necklace 13.29% held up by Shin and Stang et al. exhibited dysphagia to solid foods, globus sensation and dyspnoea [29] [30]. According to WHO, grade-1_a was 4.05%, grade-1_b 18.50%, grade-2 23.70%, and grade-3 53.75% near to Chen et al. paper [28].

About the investigation serum FT_3, FT_4, and TSH determination is an essential first step of investigation to know the functional status of goiter, whether it is hypo, hyper, or euthyroid, to take medical or surgical decision held up by Chen et al. paper [28]. Serum calcitonin measurement is one of the indicators of medullary carcinoma kept up by Toledo et al. work [31]. To assess any kind of thyroid swelling high-resolution USG, and USG guided FNAB or FNAC is benchmark procedure to give the features of microcalcification, irregular margin, hypoechogenicity, extrathyroidal extension, hypervascularity, and abnormal lymph node carried out by Radecki and Fish et al. research [32] [33]. CT scan and MRI help to detect the nodal disease, irregular borders or microcalcification, and tracheal compression kept up by Cooper et al. presentation [34]. If any suspicion of malignancy intravenous contrast should avoid which delay the RAI treatment carried out by Leung et al. paper [35]. FNAC or FNAB has excellent patient compliance, and diagnosis including colloid nodules, thyroiditis, papillary carcinoma, medullary carcinoma, anaplastic carcinoma, and lymphoma except follicular adenoma and follicular carcinoma not due to cytological but histological characteristics of capsular and vascular invasion kept up by Cibas et al. study [36]. Preoperative laryngoscopy is essential to assess the vocal cord mobility is normal or restricted due to invasion of RLN by thyroid malignancy held up by Randolph et al. work [37].

Disease pattern showed euthyroid benign goiter was 142 (82.08%) and euthyroid malignant goiter 31(17.92%) near to Pacini et al. study showed the incidence of malignancy of thyroid swelling was 10% [38]. Out of benign goiter, nodular was 73.24%, MNG 17.61%, and follicular adenoma 9.15% against our work by Vanderpump MPJ, and Altaf et al. study showed MNG was 37.3%, nodular goiter 23.2% [23] [22].

Thyroid malignancy in our study showed papillary carcinoma was 93.54%, follicular carcinoma 3.23%, and medullary carcinoma 3.23% near with Altaf et al. work showed papillary was 83.1%, medullary 9.9%, and follicular 6.9% [22]. Plauche and Al-Salamah et al. also exhibited papillary carcinoma was highest of all other thyroid malignancy 57-89% consistent with our study [39] [40].

The surgical procedure revealed in our study hemithyroidectomy 78.61%, total thyroidectomy 20.23%, completion thyroidectomy 1.16 %, and selective neck dissection (SND) performed in two patients, one with total thyroidectomy, and another with completion thyroidectomy. We did hemithyroidectomy, 136 patients, in which nodular goiter was 104, MNG 14, follicular adenoma 13, and low-risk papillary carcinoma 05. About nodular goiter, MNG (Clinically one side was micronodular), and follicular adenoma (one lobe), hemithyroidectomy was perfect operation supported by Mehanna and Kandil et al. study [41] [42]. Hemithyroidectomy of low-risk papillary carcinoma needs long term to follow up essential to understanding the patient carried out by Udelsman and Shrime et al. work [43] [44]. We did total thyroidectomy 35 patients in which MNG was 11, papillary carcinoma 22, follicular carcinoma 01, and medullary carcinoma 01consistent with Bron and Udelsman et al. study [45] [46]. We did completion thyroidectomy for two patients in which one patient was incidental diagnosis of high-risk papillary carcinoma with tumor size >4 cm and age >55 years. Another case of low-risk papillary carcinoma, in follow up she presented with lymph node metastasis need completion thyroidectomy with selective neck dissection to provide adjunct RAI ablation carried out by Barney and Simo et al. [47] [48].

About postoperative complications in the present study showed hemorrhage was 02 (1.16%), hematoma 05(2.89%), wound infection 01 (0.58%), keloid 01(0.58%), temporary/unilateral RLN paralysis 35 (20.23%), permanent/bilateral RLN paralysis 02 (1.16%), and temporary hypoparathyroidism 12 (6.93%) near to Ignjatovic and Derby et al. series [49] [50]. IONM was not available in our surgical set up due to the high cost, and the maximum of our patients came from the poor class held up by Al-Qurayshi et al. paper [51].

V. Conclusion

Thyroid operation is now a regular procedure for surgeon and should maintain some rules and regulations. The informed written consent from the patient and attendant should include before thyroidectomy. The potential complications discussed

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with the patient, and the probable surgical option disclose for the patient preferences. After the selection of the patient for thyroidectomy, all investigation should complete to diagnose the swelling is benign or malignant. If malignant swelling, carefully find out the staging of the malignant tumor to select the operational procedure. Thyroid surgery is a team work for surgeons and assistants to attain successful thyroid surgery without any complications.

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Conflict of interest: There is no any conflict of interest.

Ethical Approval: The study was approved by Institutional Ethical Committee.

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