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Pathogenesis and Microbiology of Otitis Media with Effusion in Children

Tahia Hashem Saleem¹, Essam A. Abo Elmagd^{2*}, Mahmud E. Khalefa², Bahaa Elhawary²

¹Faculty of Medicine, Assiut University, Assiut, Egypt

²Faculty of Medicine, Aswan University, Aswan, Egypt

Email: *esamali801@yahoo.com

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Abstract

Objective: To detect different etiological factors of otitis media with effusion (OME) and different types of microorganisms in middle ear fluids. **Methods:** This prospective study included 60 patients with otitis media with effusion diagnosed at the otorhinolaryngology (ENT) outpatient clinic with age ranged from 2 to 16 years, 36 males and 24 females. **Results:** Predisposing factors of OME were rhinosinusitis in 58.3% of cases, adenoid in 20% of cases, adenotonsillitis in 16.7% of cases and tonsillitis in 5% of cases. Microorganisms in middle ear fluids were negative in 70% of cases, isolation of streptococcus pneumonia in 16.7% of cases, *Haemophilus influenzae* 6.7% and *Moraxella catarrhalis* 6.7%. **Conclusion:** Rhinosinusitis was the most frequent predisposing factor of cases of OME. Positive bacterial culture was found in 30% of cases.

Keywords

Otitis Media with Effusion, Microbiology, Pathogenesis

1. Introduction

OME is characterized by a non-purulent effusion of the middle ear that may be either mucoid or serous without acute symptoms. It is one of the common causes of deafness among children. When inadequately treated, it may lead to major functional limitations like hearing loss and impairment in development of speech and language [1]. The reason for treatment failure is probably due to partial knowledge of etiopathological mechanisms responsible for the beginning and the course of the disease in the mucous membrane of the middle ear [2]. OME includes inflammation of the tubotympanum and an accumulation of fluid

within the middle ear. The disturbance of the excretory function is due to mechanical obstruction of the Eustachian tube (ET) and/or mucociliary dysfunction of the tubotympanum. Mechanical obstruction has been emphasized for a long time, but recent laboratory investigations have established the critical importance of mucociliary function in the tubotympanum. However, the pathogenesis is not fully understood. It is unclear whether the cilia functions normally throughout the full length of the ET in the chronic phase of OME [3]. OME was previously considered to be bacteriologically sterile. However positive bacterial cultures have been demonstrated in 40% of middle ear fluid; *Streptococcus pneumoniae* and *Haemophilus influenza* account for the majority of cases [4] [5] [6].

2. Patients and Methods

This prospective study included 60 patients with otitis media with effusion diagnosed at ENT outpatient clinic, South Valley university hospital during the period from December 2015 to December 2016. All patients gave written informed consent before entering the study and the study protocol was approved by the ethical committee of the faculty of Medicine, South Valley University.

The diagnosis of otitis media with effusion was made in our study group on the basis of the following clinical findings in the form of dull tympanic membrane, loss of con light, loss of landmarks of the eardrum, blue drum, and/or alteration in the mobility of tympanic membrane. Every patient had complete ear, nose and throat examination. All cases had detailed assessments aided by X-ray of soft tissue neck (lateral view) for adenoidal enlargement and an audiological assessment. All patients were subjected to tympanometric screening (Immittancemeter-Interacoustics-Automatic AZ26, Denmark).

3. For All Patients Included in the Study

Patients subjected to surgical management in the form of myringotomy and ventilation tube insertion (grommet), myringotomy and adenoidectomy or myringotomy and adenotonsillectomy according to the predisposing factor. Samples of middle ear effusions were collected using sterile syringe during the puncture of tympanum or tympanostomy tube placement. Sample was sent for culture and sensitivity. For all samples, culture done using CLED media, incubation at 37 for 48 hours, for the negative results the time extended 24 hours more. Sensitivity for the positive results applied on neutral agar using the antibiotic discs and according to the diameter of inhibition, the results were recorded.

4. Statistical Analysis

Date entry and data analysis were done using SPSS version 19 (Statistical Package for Social Science). Data were presented as number, percentage, mean, standard deviation and median. Chi-square test was used to compare between qualitative variables. Mann-Whitney test was used to compare quantitative variables between groups in case of non-parametric data. P-value considered statistically

significant when $P < 0.05$.

5. Results

A total of included 60 patients with otitis media with effusion with age ranged from 2 to 16 years, 60% were less 5 years (**Table 1**), 36 males and 24 females (**Table 2**). Bilateral OME with rhinosinusitis diagnosed in 58.3%, with adenoid enlargement in 20%, with adenotonsillitis in 16.7% and with tonsillitis in 5% (**Figure 1**). Bilateral myringotomy and grommet tube insertion only was done in 58.3% of cases, with adenoidectomy in 20% of cases, with adenotonsillectomy in 16.7% and with tonsillectomy in 5% of cases (**Table 3**). Culture sensitivity results were negative in 70% of cases while positive culture in 30% of cases (*Streptococcus pneumonia* 16.7%, *Haemophilus influenzae* 6.7, *Moraxella catarrhalis* 6.7%) (**Table 4**).

Table 1. Age distribution of the studied groups.

Age	Study (n = 60)	P. value
	No.	% < 0.001
0 - 5 years	36	60.0
5 - 10 years	18	30.0
10 - 16 years	6	10.0

Table 2. Sex distribution of the studied groups.

Sex	Study (n = 60)	P. value
	No.	0.121%
Male	36	60.0
Female	24	40.0

Table 3. Operations done.

Operations done	No. (n = 60)	%	P. value
Bilmyringotomy and grommet tube insertion and adenoidectomy	12	20.0	<0.001
Bilmyringotomy and grommet tube insertion and adenotonsillectomy	10	16.7	
Bilmyringotomy and grommet tube insertion and tonsillectomy	3	5.0	
Bilmyringotomy and grommet tube insertion	35	58.3	

Table 4. Culture.

Diagnosis	No. (n = 60)	%	P. value
<i>Streptococcus pneumonia</i>	10	16.7	<0.001
<i>Haemophilus influenzae</i>	4	6.7	
<i>Moraxella catarrhalis</i>	4	6.7	
Negative	42	70.0	

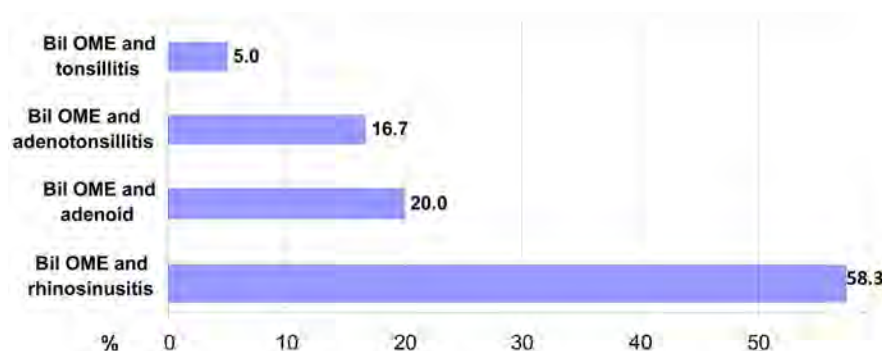


Figure 1. Predisposing factors of OME in study group.

6. Discussion

Otitis media with effusion (OME) is the presence of effusion within the middle ear cleft. It is one of the most common diseases of early childhood, 60% to 80% of children will have at least one episode during their first year of life [7] [8] 10 - 11. Microorganisms that locally colonize the adenoids and epithelium of the upper respiratory tract are the originator of inflammation process, which lead to mucous secretion in the middle ear. Identification of cytokines in secretion of the middle ear of the patients with OME indicates that the inflammatory mediators play a role in pathogenesis of OME [2].

In our prospective study, we included 60 patients with otitis media with effusion. patients subjected to surgery, suction of the effusion fluid was done and the sample sent for culture and sensitivity.

In our study, we found that the preschool age group (≤ 5 years) represented 60% of our patients which is in agreement with most of the published studies [2]. Li *et al.*, 2016 [9] reported that 60% to 80% of children will have at least one episode during their first year of life.

Clinical guidelines from a joint commission of specialties document that screening surveys of healthy children between infancy and age 5 years show a 15% - 40% point prevalence in middle ear effusion. Furthermore, among children examined at regular intervals for 1 year, 50% - 60% of childcare attendees were found to have OME [10]. On the other hand, Khan *et al.*, 2006 [6] in Pakistan reported that only 10.34% of his OME cases were below 5 years and 62% of his patients were 5 - 8 years. That difference may be due to sampling enrolment error in his study as there are no cases included below the age 2 year. Age is clearly an important predisposing factor in the development of OME. In infants, the Eustachian tube has a nearly horizontal orientation. In addition, the size and shape of the Eustachian tube at birth, unlike those in adults, are unfavorable for ventilation of the middle ear [11]. In our study, boys were more affected with OME than girls (60% vs. 40%). This is in agreement with Kubba *et al.*, 2000 [2], Khan *et al.*, 2006 [6] and Erdivanili *et al.*, 2012 [11] who reported that boys are more likely to have OME than girls but with no significant difference. In our study we found that rhinosinusitis, adenoid hypertrophy and chronic tonsillitis were the most common predisposing factors (58.3%, 20%, and

5%; respectively). Khan *et al.*, 2006 also reported that rhinosinusitis, adenoid hypertrophy and chronic tonsillitis were the most common predisposing factors (36.8%, 34.5%, and 13.8%; respectively). Joshua, 2008 [12] reported that upper-respiratory tract infection was found to have a pronounced association with bilateral status of effusion at baseline. However, Balram and his colleague, 2001 reported that 95% of their patients had adenoid hypertrophy. That difference in results may be due to recording of small sized adenoids as Balram *et al.*, 2001 divided his patients with adenoids into large adenoids present in 45% and medium and small adenoids in 50% of his cases. Damoiseaux *et al.*, 2006 [13] reported that recurrent upper respiratory tract infection is a risk factor for persistence of acute otitis media and development of otitis media with effusion. In our study bilateral myringotomy and grommet tube application in combination to adenoidectomy were done to 20% and bilateral myringotomy with grommet tube application and adenotonsillectomy were done to 16.7%, bilateral myringotomy and grommet tube application were done in 58.3%, bilateral myringotomy and tonsillectomy were done in 5% of case. In other words myringotomy and grommet tube application was done in 86.7% of patients and adenoidectomy was done in 36.7% of patients. In a study in Pakistan [6] bilateral myringotomy and grommet tube application in combination to adenoidectomy were done to 17.5%, bilateral myringotomy and adenoidectomy were done to 14%, bilateral myringotomy and grommet tube application and adenotonsillectomy were done to 21%, bilateral myringotomy and grommet tube application were done in 29.8%, and bilateral myringotomy was done in 12.3% of cases. In other words in this study myringotomy and grommet tube application was done in 73.6% of patients and adenoidectomy was done in 52.5% of patients. The difference between both results is due to the lower frequency of hypertrophied adenoids among our patients. In our study suction of the effusion fluid was done and the sample send for culture and sensitivity. The results of culture and sensitivity were positive in 18 cases (30%). This is in agreement with Sedeek *et al.*, 2016 [14], who reported that bacterial culture of OME showed positive result for 20% - 30% of patients. *Streptococcus pneumoniae*, *Haemophilus influenza* and *Moraxella catarrhalis* are the three most common bacterial species, isolated by culture, in the middle ear effusion. Saafan *et al.*, 2013 [15] analyzed the adenoid biofilms for the most common middle ear pathogens (*S. pneumoniae*, *H. influenzae*, *M. catarrhalis*, and *S. aureus*) employing multiplex-PCR (polymerase chain reaction) in parallel with Scanning electron microscopy (SEM). They found that 96% of adenoid samples had middle ear pathogens present. As regards that point there are many controversies among different studies and literatures. OME was previously thought of as a sterile inflammatory process, as bacterial cultures were frequently negative. Later, nucleotide amplification techniques demonstrated that these effusions contain genomic material of pathogenic bacteria, which remains present up to 4 weeks after treatment with antibiotics. Furthermore, bacterial mRNA and proteins have also been found in the effusions, indicating that these bacteria remain metabolically active. These findings lead to the hypothesis that, in OME, otopa-

thogenic bacteria live in a specialized structure, called “biofilm” [16]. Regardless of the cause of acute otitis media, eustachian tube dysfunction is nearly universal in otitis media with effusion. As further evidence, ligation of the eustachian tube in animals invariably leads to the formation of a persistent middle ear effusion. Once the acute inflammation and bacterial infection have resolved, a failure of the middle ear clearance mechanism allows middle ear effusion to persist. Many factors have been implicated in the failure of the clearance mechanism, including ciliary dysfunction; mucosal edema; hyperviscosity of the effusion; and, possibly, an unfavorable pressure gradient [13]. Otitis media with effusion does not necessarily follow acute otitis media. Theories to explain the development of middle ear effusion in this case include the secretion of fluid from inflamed middle ear mucosa. This theory proposes that the middle ear mucosa is sensitized by previous exposure to bacteria, and continued antigenic challenge from occasional reflux induces the production of the effusion. On the contrary multiple studies have revealed that the same flora of bacteria is present in otitis media with effusion as in acute otitis media; these findings indicate that this effusion is not sterile [17]. Okomoto *et al.* 1993 [18] reported that adeno and rhinoviruses of upper respiratory tract may invade the middle ear mucosa and stimulate it to increase secretory activity. Tran 2005 [19] reported that inadequate antibiotic therapy in acute suppurative otitis media lead to low grade infection which act as stimulus for mucosa to secrete more fluid.

7. Conclusion

Of the whole patients of OME, 60% were under school age and only 10% of patients were above 10 years. Rhinosinusitis was the most frequent predisposing factor of cases (58.3%), followed by adenoids enlargement (20%) then adenotonsillitis (16.7%). Positive bacterial culture was found in 30% of cases.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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Department of Otolaryngology—Head and Neck Surgery, Baylor University, Waco.

The Effect of Allergic Rhinitis on Quality of Life in Patients Suffering from the Disease: A Case Control Study

Ioannis D. Komnos¹, Maria C. Michali¹, Asimakis D. Asimakopoulos², Lentiona V. Basiari¹, Ioannis G. Kastanioudakis^{1*}

¹Department of Otorhinolaryngology, Faculty of Medicine, School of Medical Sciences, University Hospital of Ioannina, Ioannina, Greece

²Department of Otorhinolaryngology, Hospital Center of Luxembourg, Luxembourg City, Luxembourg
Email: j.d.komnos@gmail.com, maria.ch.michali@gmail.com, aasimak@outlook.com, ledi_poli@hotmail.com,

*kastanioudakisi@gmail.com

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Abstract

Background: Apart from nasal symptoms allergic rhinitis was associated with ocular or other symptoms affecting social and somatic activities or sleep. In the literature, only a few prospective studies regarding allergic rhinitis and holistic consideration of quality of life were reported. **Methods:** The aim of this case control study was to investigate prospectively the effect of allergic rhinitis on quality of life. 103 patients (50 males and 53 females) with mean age 30.8 ± 13.4 years, range 18 - 55 years, diagnosed with the disease with skin prick testing, were evaluated regarding quality of life by using the General Health Questionnaire-28, the Athens Insomnia Scale (AIS) and the mini Rhinoconjunctivitis Quality of Life Questionnaire. 50 participants without history or allergic symptoms during the last 12 months formed the control group. Independent sample t-tests were conducted to assess significant differences between patients with allergic rhinitis and controls regarding all the examined parameters concerning quality of life. Data was analyzed using Windows statistical package of SPSS version 18.0 (SPSS Inc., Chicago, IL, USA). Statistical significance was set *a priori* at 0.05. **Results:** Dust mite, mixed grass and pollens were the most common allergens found in patients with allergic rhinitis. It was also observed that the examined patients showed statistically worse results concerning not only physical and social activities but also quality of sleep and nasal or other symptoms as compared to healthy controls ($p < 0.05$). However there were no statistically significant differences regarding anxiety and severe depression between the examined groups ($p > 0.05$). **Conclusion:** Allergic rhinitis negatively affected the quality of life especially the parameters that were related to psychosocial activities and sleep, which might have an impact on daily living.

Keywords

Quality of Life, Allergic Rhinitis, Questionnaire, Sleep Disorders, Physical and Social Activities

1. Introduction

Allergic rhinitis (AR) is an IgE-mediated inflammatory chronic disorder of the nasal mucosa caused by exposure to allergens [1] [2] which affects a significant percentage of population varying from 10% - 35% among different countries [3]-[8] with an increasing trend over the last years attributed to higher environmental exposure to allergic factors, longer stay in closed spaces and other social or economic causes [9] [10] [11].

Nasal symptoms such as nasal congestion, watery rhinorrhea, nasal itching, sneezing and post-nasal drip, are primarily observed in patients with AR [12] [13]. Snoring or mouth breathing due to nasal obstruction, ocular itching, pain or tearing, cough, loss of taste or smell, or even hearing dysfunction might be secondary chronic or recurrent symptoms of allergic rhinitis which can lead to sleep disturbance, diurnal fatigue, irritability or sleepiness affecting emotional, physical, and social aspects of quality of life [12] [13] [14] [15].

The effect of AR in quality of life is difficult to be assessed. Perceptions of quality of life change dynamically and variations may be referred even between individuals [16]. Therefore many scales and instruments which include physical, psychological and social dimensions as determined by the World Health Organization (WHO) have been developed to quantify assessment of quality of life, in forms of specific validated questionnaires [17]. However, because of the fact that AR is a multifactorial disease that is correlated with both genetic and environmental factors, weather conditions, age and local cultural and ethnic aspects, there have been proposed certain modifications and versions of these questionnaires for different populations and age groups [3] [18] [19].

The purpose of this study was to investigate the effect of AR on quality of life, in Greek adults suffering from the disease. Nasal, ocular and other secondary symptoms of AR can cause great discomfort in daily activities influencing family, social and professional life. The current study tries to recognize the factors that affect the quality of life of patients with AR. The knowledge of how AR affects physical, mental and social status may assist the clinicians to better understand the impact of disease in patients' life and give new directions for treatment options.

2. Methods

2.1. Patients

The study was carried out from March 2018 to March 2019. One hundred and three patients with at least one or more symptoms of AR such as nasal itching,

rhinorrhea, sneezing and nasal congestion met the inclusion criteria which include 1) moderate to severe allergic rhinitis according to AR and its Impact on Asthma (ARIA) guidelines [20], 2) chronic clinical manifestations of AR and 3) positive skin prick test, 4) age above 18 years old. Patients with a) other chronic diseases or comorbidities such as asthma, sinusitis, food or medication allergy that could alter the skin tests, b) unstable work/academic activity that could affect sleep and quality of life, c) mild AR, d) age less than 18 years old and e) reluctance to participate to the study, were excluded.

According to ARIA guidelines [20], sleep disturbance is one of the factors that reclassify the severity of AR from mild to moderate-severe. In order to have a more homogenous examined sample we decided to exclude patients with mild AR from the study as the effect in quality of life would be limited as compared to those patients with moderate to severe AR. We only included adults in our study as children with AR present differences as compared to adults especially concerning the comorbidities which would have affected our results. Fifty participants with no history of AR or other allergies formed the control group.

The study was approved by the ethical board of the University Hospital of Ioannina, Greece. All the participants were in agreement with the testing protocol and gave their informed consent for participation in accordance with our University's Medical School Institutional Review Board procedures.

2.2. Materials and Methods

All the patients that were enrolled in the study were requested to complete 3 questionnaires: The General Health Questionnaire-28 (GHQ-28), the Athens Insomnia Scale (AIS) and the mini Rhinoconjunctivitis Quality of Life Questionnaire (miniRQLQ). The GHQ-28 that was developed by Goldberg in 1978, translated and modified for the Greek population by Garyfallos *et al.* [21] included 12 questions investigating disorders related to somatic symptoms, anxiety, social dysfunction and severe depression. Each question had numeric scores ranging from 1 to 4 (the higher score indicated worse results).

The AIS questionnaire examined characteristics of sleep quality within the last month by using 8 questions which were marked with numeric scores from zero (good results) to three (worst results) [22]. The miniRQLQ [23] consisted of 14 questions covering 7 aspects of daily life (one question for physical functioning, one for social and emotional functioning, another one for sleep disorder, two questions for practical problems, three regarding rhinitis, three for eye symptoms and finally three questions concerning other symptoms). The participants were asked to rank the severity of disturbance within last months on a seven-point scale (0 no disturbance to 6 very severe disturbance).

Skin prick testing was performed with the use of 48 allergic extracts provided by BIAL-Aristegui, Italia, which included allergens such as mixed grass, plane (*Platanus vulgaris*), olive (*Olea europaea*), dust mite, pollens-dermatophytes, *Aspergillus fumigatus*, mixed cockroach, animal epithelium (dog, cat, horse etc.),

α -lactalbumin (α LA), β -lactoglobulin (β LG) and casein [24]. The flare and wheal were evaluated 15-20 minutes after the test. The wheal was compared with the positive (histamine phosphate 2.75 mg/ml) and negative control (glycerin saline). Test was regarded as positive if the wheal was equal to or larger to histamine control (or greater than 3 mm) [25].

2.3. Statistics

For statistical analysis independent sample t-tests were conducted to assess significant differences between patients with allergic rhinitis and controls regarding all the examined parameters concerning quality of life. Data was analyzed using Windows statistical package of SPSS version 18.0 (SPSS Inc., Chicago, IL, USA). Statistical significance was set a priori at 0.05.

3. Results

The AR group was composed of 50 males and 53 females. Their mean age was 30.8 ± 13.4 years (range 18 to 55 years). The controls were 19 males and 31 females with a mean age of 26.1 ± 7.3 years (range 18 to 50 years).

The most common allergens that were found in the group of allergic rhinitis and are presented in **Figure 1**, were dust mite, mixed grass and pollens with 63.4%, 60.2%, 48.6% of patients testing positive, respectively (**Figure 1**).

Regarding the quality of life, GHQ-28 revealed that patients with AR had higher scores and therefore worse results than controls regarding not only somatic symptoms but also social activities. Specifically, AR patients were feeling greater pressure or pain in head and they were slower in executing tasks as compared to controls. However, as concerned to the examined parameters anxiety and severe depression, there were no statistically significant differences between AR and control groups (**Table 1**).

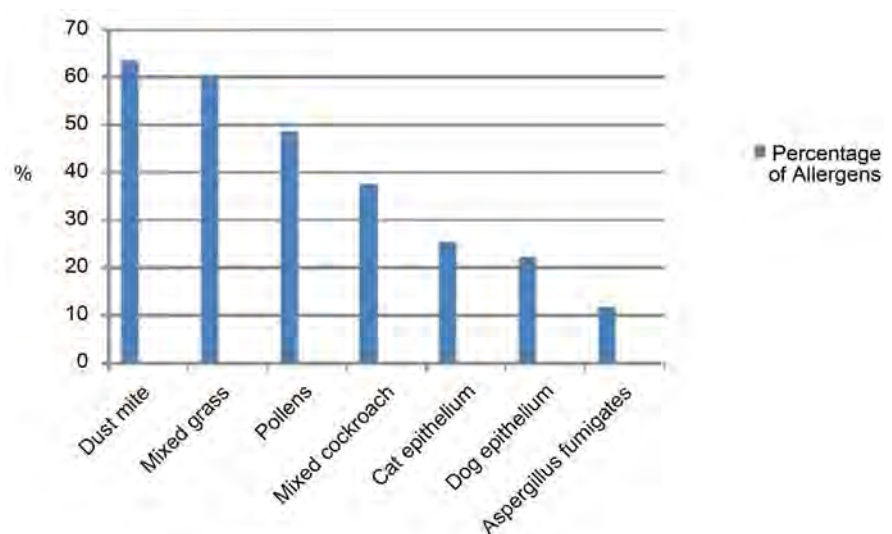


Figure 1. Percentage of most common allergens identified in AR patients with positive skin prick testing.

Table 1. Statistically significant differences found between AR patients and controls with the use of modified GHQ-28 for the Greek population.

Subcategories of modified GHQ-28 (within last 2 weeks)	P-Value	Patients with AR. Score of answers (mean \pm SD)	Controls Score of answers (mean \pm SD)
Feeling perfectly well and in good health	p = 0.027	2.26 \pm 0.85	1.68 \pm 0.45
Feeling in need for a good tonic	p = 0.03	1.91 \pm 0.74	1.14 \pm 0.40
Feeling run down and out of sorts	p < 0.001	2.20 \pm 0.82	1.26 \pm 0.48
Feeling that you are ill	p < 0.001	2.12 \pm 0.99	1.36 \pm 0.54
Getting any pains in your head	p = 0.005	2.07 \pm 0.87	1.42 \pm 0.33
Feeling of tightness or pressure in your head	p < 0.001	1.96 \pm 1.00	1.16 \pm 0.39
Feeling nervous or under strain	p < 0.001	2.12 \pm 0.61	1.36 \pm 0.51
Taking longer over the things you do	p < 0.001	2.17 \pm 0.61	1.44 \pm 0.48
Feeling capable of making decisions about things	p < 0.001	2.11 \pm 0.59	1.58 \pm 0.41
Able to enjoy your normal day-to-day activities	p = 0.015	2.25 \pm 0.68	1.48 \pm 0.47
Found that the idea of taking your own life kept coming into your mind	p = 0.135	1.05 \pm 0.27	1.00 \pm 0.00
Feeling that you couldn't do anything because your nerves were too bad	p = 0.066	1.64 \pm 0.72	1.43 \pm 0.50

SD: Standard deviation.

With the use AIS questionnaire, it was also observed that quality of sleep was worse in patients with AR than in controls with the scores of this questionnaire being statistically higher in AR patients for all its subscales (**Table 2**).

Finally, the analysis of results from miniRQLQ unfolded that all aspects of this questionnaire (respecting physical and social functioning, quality of sleep, nasal, ocular or others symptoms such as fatigue, thirst and irritability) presented again statistically significant lower and consequently better scores in controls than in AR patients (**Table 3**).

4. Discussion

In the current study, it was observed that in patients with moderate to severe AR, there was a significant deterioration in nearly all the subjective factors that concern quality of life including physical, social and emotional parameters and sleep disorders as they were quantified with the use of worldwide applied questionnaires modified for the Greek population; and only the parameter severe depression was not influenced by AR symptoms. Moreover it was documented that dust mite, mixed grass and pollens were the most common allergens identified in our AR patients.

Similarly to our study, Juniper *et al.* [21] reported that AR symptoms were related with discomfort to patients and negative impact in quality of life in general.

Table 2. Quality of sleep for AR patients and controls assessed with AIS questionnaire.

Parameters of AIS Questionnaire (within last month)	Patients with AR (mean \pm SD)	Controls (mean \pm SD)
Sleep induction $p < 0.001$	1.93 \pm 0.58	1.30 \pm 0.43
Awakenings during the night $p < 0.001$	2.04 \pm 0.99	1.18 \pm 0.49
Final awakening $p < 0.001$	1.77 \pm 0.87	1.06 \pm 0.44
Total sleep duration $p = 0.005$	1.68 \pm 0.60	1.04 \pm 0.37
Sleep quality $p = 0.003$	1.70 \pm 0.71	1.12 \pm 0.35
Well-being during the day $p = 0.001$	1.82 \pm 0.83	1.25 \pm 0.36
Functioning capacity during the day $p < 0.001$	1.68 \pm 0.55	1.10 \pm 0.22
Sleepiness during the day $p = 0.013$	1.85 \pm 0.76	1.16 \pm 0.34

SD: Standard deviation.

Table 3. Comparison of quality of life between AR patients and controls according to miniRQLQ.

Parameters of miniRQLQ (within last 2 weeks)	Patients with AR (mean \pm SD)	Controls (mean \pm SD)
Regular activities at home or work $p < 0.001$	2.68 \pm 1.63	0.56 \pm 0.64
Social activities $p < 0.001$	2.38 \pm 1.71	0.42 \pm 0.57
Sleep disorders $p < 0.001$	2.75 \pm 2.06	0.70 \pm 0.90
Practical problems-Need for nasal or eye rub $p < 0.001$	3.14 \pm 1.96	0.80 \pm 0.81
Practical problems-Need for nasal clearance $p < 0.001$	3.60 \pm 1.77	0.58 \pm 0.88
Nasal symptoms-Sneezing $p < 0.001$	3.44 \pm 1.81	0.71 \pm 0.79
Nasal symptoms-Congestion $p < 0.001$	4.01 \pm 1.70	0.74 \pm 0.82
Nasal symptoms-Watery rhinorrhea $p < 0.001$	3.34 \pm 2.01	0.56 \pm 0.74
Eye symptoms-Itching $p < 0.001$	1.98 \pm 1.11	0.46 \pm 0.66
Eye symptoms-Pain $p = 0.002$	0.84 \pm 0.68	0.18 \pm 0.31
Eye symptoms-Tearing $p < 0.001$	1.52 \pm 1.14	0.34 \pm 0.47
Fatigue $p < 0.001$	1.56 \pm 1.59	0.51 \pm 0.35
Thirst $p = 0.001$	1.08 \pm 0.85	0.26 \pm 0.34
Irritability $p < 0.001$	1.46 \pm 1.18	0.32 \pm 0.30

SD: Standard deviation.

In addition, Maspero *et al.* [26] and Schatz [27] found that AR had adverse effects on sleep, daily activities, physical, social and mental status. Association of AR symptoms with poor mental health, increased stress, depressed mood and work or social limitations was also found by Kim *et al.* [28] [29] and by Bhattacharyya [30] in a Korean and American study, correspondingly. Several studies documented that increased thirst and difficulties in concentrating were the most bothered situations in AR patients [31] [32], whilst others demonstrated that patients with AR were impaired in many domains of their daily lives [33] [34].

Particularly, regarding sleep disorders, an important factor that affects quality of life, Klossek M *et al.* displayed that nearly 60% of adults and almost 90% of

children who suffered from AR presented sleep disturbances [35]. Furthermore, others studies indicated that nasal congestion which was considered by AR patients as their most troublesome symptom; was closely associated to their rhinitis-related sleep problems mainly due to breathing disorders during sleeptime which could cause, fragmented or partial sleep, sleepiness and consecutive tiredness, fatigue and irritability [2] [36]-[42]. Additionally, allergic symptoms such as sneezing, rhinorrhea and nasal pruritus along with different components of the immune and inflammatory response could also have an impact on sleep and daytime sleepiness impairing the quality of life [41].

In fact quality of life is considered to be negatively affected not only by the common symptoms of AR but also from the function of mediators such as histamine, leukotrienes (C4 and D4), interleukins (IL-1, IL-4, IL-5, and IL-6), prostaglandin D2 and inflammatory cytokine IFN- γ , that take part in the pathophysiology of the disease via modulation of central nervous system processes causing negative effects on the sleep-wake cycle and subsequently poor sleep quality [43] [44] [45].

Indeed regarding the obstructive sleep apnea, Cao *et al.* [46] reported that the prevalence of AR in obstructive sleep apnea (OSA) was considerably high and children with sleep-disordered breathing suffered from a higher incidence of AR than non-sleep-disordered breathing. However OSA adults accompanied with AR did not have any influences on sleep parameters [46].

In our study, we demonstrated that certain factors which quantify the quality of life of AR patients were impaired. We found that physical, psychological and social tasks were negatively affected in AR patients leading to limitations on daily activities and sleep but anxiety and severe depression were not influenced.

In order to add further validation in our study, apart from the clinical diagnosis of AR, we used skin prick testing. Thus, we also observed that the most common allergens found in the Greek population were dust mite, mixed grass and pollens frequently found in environments of Southern Europe [47] [48].

However, our study had several limitations. First of all, the concept of quality of life is somewhat subjective, varies among people and depends on the degree of individual expectations that might alter over time with the evolution of the disease. Therefore we tried to “measure the quality of life” by using scientifically recognized disease-specific questionnaires as recording tools. Secondly we included in our study only adults with moderate to severe AR. Although, AR concerns not only adults but also children or adolescents, we excluded these patients in order to have a more homogenous examined sample and to avoid possible difficulties in responding to questionnaire in such ages. Patients with mild AR were also excluded from the study as their symptoms would be insufficient to have an effect on their quality of life.

5. Conclusion

Conclusively, the results of the current study highlight that AR negatively affect

not only the somatic but also social and emotional aspects of life, and especially sleep and wakening, impairing the quality of life of AR patients in general. This problem should be always taken into consideration by physicians who manage patient with AR in order to have a better outcome with the following treatment.

Conflicts of Interest

The authors have no conflicts of interest to disclose.

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Financial Disclosure

There are no financial relationships that could be broadly relevant to the work.

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Frequency of Malignancy in Solitary Thyroid Nodule in a Tertiary Level Hospital of Bangladesh

Md Shazibur Rashid^{1*}, Najnin Akhter², Md Shafiqur Rahman¹, Jahangir Alam Majumder¹, A. H. M. Delwar¹, Md Golam Mustafa¹

¹Otolaryngology, Comilla Medical College, Cumilla, Bangladesh

²Pediatrics, Comilla Medical College, Cumilla, Bangladesh

Email: *drsajiburrashid@gmail.com

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Abstract

Objectives: To determine the frequency of thyroid malignancy in clinically and sonographically solitary thyroid nodule in patients undergoing thyroidectomy in Comilla Medical College Hospital. **Methods:** A cross sectional study was carried out at the Department of Otolaryngology and Head Neck Surgery of Comilla Medical College Hospital during the period from January 2016 to January 2019. This study includes all patients admitted and undergoing surgery with solitary thyroid nodule. **Results:** Out of 188 patients 146 patients were female and 42 patients were male with female:male ratio of 3.4:1. Out of 188 patients 24 patients were found histologically thyroid malignancy. Among them 14 patients were male and 10 patients were female. Papillary carcinoma was found in all cases. **Conclusions:** Follicular carcinoma is rare in our country. Histopathological examiners may not efficiently be doing their job to differentiate carcinoma from adenoma.

Keywords

Solitary Thyroid Nodule, Papillary Carcinoma, Follicular Carcinoma

1. Introduction

Nodular goiter is a common disease in our country. Iodine deficiency is the main cause. Though fortification of salt with iodine is mandatory in our country, lack of monitoring fails its purpose. Fluctuation of iodine level in blood in growing age and pregnancy causes abnormal stimulation to follicular cells which results in nodular goiter. Rise of incidence of thyroid malignancy is due to rad-

iation hazard in occupation, X-ray and CT scan [1] [2].

The solitary thyroid nodule may be defined as a discrete swelling in an otherwise impalpable gland. The swelling is often noticed accidentally by the patients or drawn to her attention by a family member, friend or neighbor. The nodule may also be encountered as an incidental finding when a patient is examined for some unrelated disease. About 70% of discrete thyroid swelling are clinically isolated. A nodule may be adenoma, cyst, multinodular goitre, thyroiditis or thyroid carcinoma [3].

Occasionally in macroscopically solitary nodule may present microscopic nodule throughout the gland. Worldwide incidence of thyroid carcinoma is about 3.7 per 100,000 populations per year [4]. There is a female preponderance of approximately 3:1 [5].

Nodules in the thyroid gland are important for their malignant potential. It is the highest among the cancer affecting endocrine glands. The importance of solitary thyroid nodule lies in the significant risk of malignancy compared with the other thyroid swelling. Many studies have been published on the risk of malignancy in patients with thyroid nodule; these studies show that the risk of malignancy is low, approximately 5%, unless the patient has an underlying risk factor, such as a history of external neck irradiation [6].

Cancer of the thyroid gland occurs at earlier ages in most part of the world. It is commonest between 20 - 40 years of age [7]. Frequency of malignancy in thyroid nodule varies among different studies in our country and worldwide. One study in our country by Rahman MJ *et al* shows percentage of malignancy in nodular goitre is 8.1% and in solitary thyroid nodule is 21.44% [7]. One study by Ashraf SA *et al.* shows incidence of malignancy in thyroid nodule is 9.89% [8]. Another study by Gandolfi PP *et al.* shows 5% [9].

Purpose of this study was to find out the relative frequency of malignancy in solitary thyroid nodule in our region.

2. Methods

Simple random sampling of prospective cross-sectional study was done. The study was carried out at Comilla Medical College Hospital during the period from January 2016 to January 2019. This study includes all the patients admitted with clinically and sonographically diagnosed as solitary thyroid nodule. All the patients treated surgically, and histopathological examination carried out. Data were analyzed by standard statistical methods. Results were analyzed by proper test of significance.

3. Results

Figure 1 shows most of the patients are at the 31 - 40 years' age range and lowest at the 11 - 20 years' age range.

Figure 2 shows 78% patients are female and 22% patients are male.

Figure 3 shows among 24 of malignant patients 14 patients are male and 10

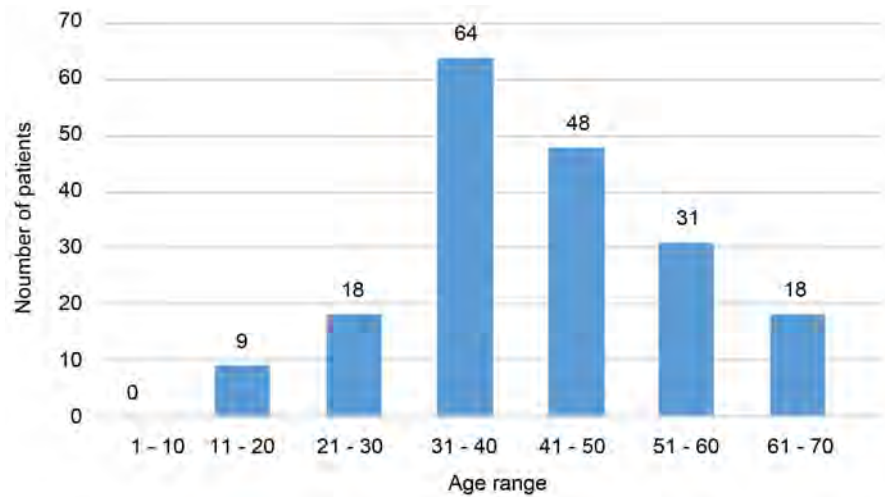


Figure 1. Age distribution (n = 188).

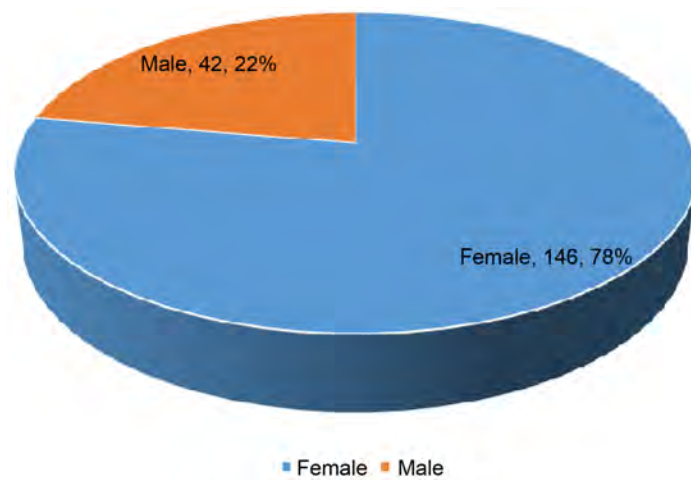


Figure 2. Sex distribution (n = 188).

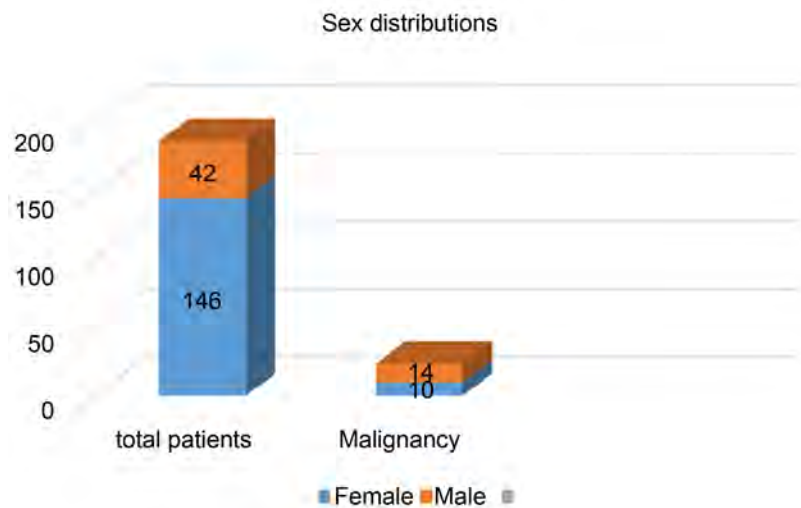


Figure 3. Shows among 24 of malignant patients 14 patients are male and 10 patients are female.

patients are female.

Table 1 shows among 24 of malignant patients most of the patients are 31 - 40 years' age group.

Figure 4 shows FNAC findings. 170 patients are nodular goitre, 13 patients are papillary carcinoma and 5 patients diagnosed as follicular adenoma.

Table 2 shows consistency of malignant thyroid nodules is hard. Most of the firm nodules are benign.

Table 3 shows 100% malignant thyroid nodules are papillary carcinoma.

Table 4 shows type of operation done in according to the nature of nodules.

Table 1. Prevalence of malignancy (age relation) n = 188.

Age groups	Total number of patients	Number of malignant patients	Percentage
11 - 20	9	0	0%
21 - 30	18	4	22.2%
31 - 40	64	10	15.6%
41 - 50	48	5	10.41%
51 - 60	31	4	12.9%
61 - 70	18	1	5.55%

Table 2. Association of histopathological findings with the consistency of solitary thyroid nodule (n = 188).

Consistency	No of Patients	Malignancy	Percentage of Consistency (n = 188)	Percentage of malignancy (n = 24)
Firm	143	4	76%	16.66%
Cystic	24	2	13%	8.33%
Hard	21	18	11%	75%

Table 3. Histopathological patterns of malignancy (n = 24).

Histological pattern	Number of patients	Percentage
Papillary carcinoma	24	100%
Follicular carcinoma	0	0%
Medullary carcinoma	0	0%
Anaplastic carcinoma	0	0%
Lymphoma	0	0%

Table 4. Types of thyroidectomy (n = 188).

Name of operations	Number of patients	Percentage
Hemithyroidectomy	170	90.42%
Subtotal thyroidectomy	5	2.65%
Total thyroidectomy	13	6.91%

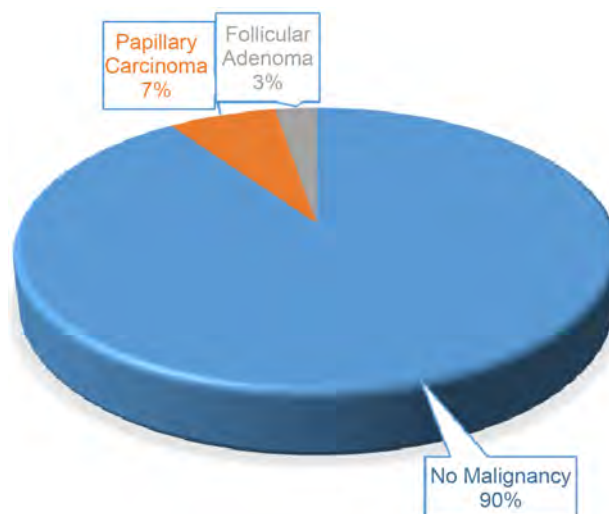


Figure 4. Preoperative FNAC findings.

4. Discussion

In this series 188 patients of nodular goiter studied prospectively during the period of 3 years, who underwent surgery in Otolaryngology department of Comilla Medical College Hospital. It is a 500-bed tertiary level hospital. This medical College is situated 100 km east of Capital Dhaka. In some extent it represent relative incidence of thyroid malignancy in Bangladesh.

In this study age of the patients ranged from 15 years to 62 years. 9 patients (4.7%) were in 11 - 20 years range group. 18 patients 9.6% were in 21 - 30 years, 64 patients 34.1% were in range 31 - 40 years' age group. 48 (25.6%) patients were in 41 - 50 years. 31 (16.4%) patients were in 51 - 60 years' age group. 18 (9.6%) patients were in 61 - 70 years' age group.

Most of the patients were in 31 - 40 years range. Mean age of the patients were 41.8 year. A similar study was done in home and abroad shows similar pattern of age distribution [10] [11] [12] [13].

In this study of 188 patients 146 (77.65%) were female and 42 (22.34%) were male. Female male ratio is 3.4:1. Goitre is more common in females worldwide. All the patients were present with painless neck swelling. All patients were evaluated clinically, biochemically and sonographically. All patients were euthyroid before surgery. FNAC report shows nodular goitre in 170 (90.4%) patients, papillary carcinoma in 13 (6.91%) patients and follicular adenoma in 5 (2.65%) patients.

Solitary thyroid nodules are usually firm in consistency. Out of 188 patients in this study of solitary thyroid nodule 143 (76%) are firm, 24 (13%) are cystic and 21 (11%) are hard in consistency. Malignant lesion was more common in hard nodule. Hardness and irregularity, due to calcification may simulate malignancy. Islam *et al.* 2009, found majority of the nodules were firm (72.03%), 11.02% were cystic and 16.95% were hard [14]. A study showed incidence of malignancy in solid nodule is 9% and in cystic nodule is 0% [15]. Another study showed inci-

dence of malignancy in cystic nodule is <2% [16].

Hemithyroidectomy were done in 170 (90.4%) patients. In that case only one lobe of thyroid gland was involved and no malignancy was found in FNAC. Decision was made on peroperative evaluation. Total thyroidectomy was done in 13 (6.91%) cases where FNAC report positive for malignancy. Subtotal thyroidectomy was done in 5 (2.65%) cases. Decision was made on preoperative and peroperative evaluations. Other study in our country showed similar pattern of FNAC Finding [8] [10]. Younger female patients with papillary carcinoma who underwent hemithyroidectomy no further operation done but in other patients with papillary carcinoma completion thyroidectomy was done followed by radioablation.

All specimen of thyroidectomy sends for histopathological examination. Out of 188 patients of nodular goitre 24 (12.76%) patients including 13 patients who are previously diagnosed by FNAC were found papillary carcinoma of thyroid. In this study no other variants of malignancy were found. Follicular carcinoma is rare in our country in different study in home and abroad shows incidence of malignancy in nodular goitre 7.5% - 13% [8] [9]. Hossain MA *et al.* in 2014 incidence was 28% [10]. Alam MM *et al.* in 2004 and Sattar MA *et al.* in 2003 incidence was 15% - 22% [12] [13].

Out of 24 patients 14 patients were male and 10 patients were female. Male female ratio is 1.4:1. 4 (22.2%) patients were at the age range of 21 - 30 years out of 18. 10 (15%) patients were in 31 - 40 years out of 64, 5 (10.4%) were in 41 - 50 years out of 48, 4 (12.9%) were in 51 - 60 years out of 31 and 1 (5%) were in 61 - 70 years' age group out of 18. Similar pattern of age distribution was found in other study in our country [8] [10].

In this series of 188 patients 13 patients were diagnosed papillary carcinoma by FNAC. On histopathological examination including 13 patients 11 more were diagnosed papillary carcinoma. In this series FNAC sensitivity is 69.2%. Follicular carcinoma is uncommon in our country. In this series we have found not a single case of follicular carcinoma in nodular goitre. All other study in home and abroad follicular carcinoma was found. Rahman MM *et al.* showed 20% [10]. Hossain MA *et al.* showed 4% [11].

5. Conclusion

Nodular goitre is very common in our country. Females are most commonly affected. But carcinoma in nodular goitre predominantly affects male patients. FNAC and histopathological evaluation are mandatory for proper treatment of every patient. Sample size and study period are not enough to show the complete picture. But with this study we can plan our future strategy for better management of goitre patient in Bangladesh.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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Surgical Management of Large Goiters in the ENT Department of CHU Mother and Child “Luxembourg”

Youssef Sidibé¹, Abdoul Wahab Haidara¹, Djibril Samaké², Abdoulaye Kanté³, Siaka Soumaoro⁴, Boubacary Guindo⁴, Nagnouma Camara⁴, Mamadou Karim Touré⁵, Mahmoud Cissé¹, Amadou Djibo⁶, Youssef Djigui Diakité⁶, Boubacar Sanogo¹, Mohamed Amadou Kéïta⁴

¹ENT and Head and Neck Surgery Department, CHU Mother-Child “Luxembourg”, Bamako, Mali

²ENT and Head and Neck Surgery Department, Reference Health Center District V, Bamako, Mali

³Laboratory of Anatomy of the Faculty of Medicine and Odontostomatology, Bamako, Mali

⁴ENT and Head and Neck Surgery Department, CHU Gabriel Toure, Bamako, Mali

⁵Department of Anesthesia Resuscitation CHU Mother-Child “Luxembourg”, Bamako, Mali

⁶Department of Endocrinology, Mother-Child University Hospital “Luxembourg”, Bamako, Mali

Email: *ysidibe2002@gmail.com

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Abstract

Objectives: To study the clinical and therapeutic profiles of voluminous goiter. **Patients and Methods:** We carried out a descriptive and prospective study, relating to a series of 30 cases of voluminous goitre, collected in the Department of Otorhinolaryngology and cervicofacial surgery (ENT and CCF) of the CHU Luxembourg Mother Child of Bamako. It has been spread over a period of 4 years from January 2015 to December 2018. Patients of all ages operated for large goitre at the ENT Department of CHU Luxembourg Mother Enfant were included. **Results:** In 4 years we collected 30 cases of voluminous goitre; during this period we realized 180 thyroidectomies, *i.e.* frequency of 16.67%. The average age was 51.37 years with an extreme ranging from 38 to 65 years. Females were common in 66.7% with a sex ratio of 0.50. The long duration of evolution has been 40 years. The sign of compression was found in 85.7%. The physical examination found a mobile swelling, hard and painless in all patients with normal endolaryngeal examination; there was no cervical lymphadenopathy. The lower dipping pole was found in 5 cases on CT. All our patients were euthyroid. The classification of TIRADS 2 was found in 80.0% of cases. Total thyroidectomy was frequent with 50.0% of cases. The average weight of the operative specimen was 586.67 g with extremes ranging from 500 g to 800 g. The size of the operative piece of 14 cm was the longest. Injury of internal jugular vein was found in 26.7% of cases. Colloid adenoma of the thyroid was found in 100% of cases, postoperative

complications of the type of hematoma of the lodge in 3.3% of cases, the release of the operative wound in 10% of cases local superinfection in 7.1%. Signs of hypothyroidism were common with 50.0%. Postoperative nasofibroscopy found good vocal fold mobility in all patients. **Conclusion:** The large goiters have become rare because of the early management of thyroid nodule. Its management must allow the prevention of recurrent and parathyroid morbidity.

Keywords

Thyroid, Large Goiter, Thyroidectomy

1. Introduction

Goitre refers to diffuse normal thyroid hypertrophies (absence of hyper- or hypothyroidism), non-inflammatory (excluding thyroiditis), and non-cancerous, It consists of initially homogeneous thyroid hyperplasia, clinically latent [1], Radiologically it is defined by an ultrasound thyroid volume of 18 ml in women, 20 ml in men [2]. The proportion of goiter is 4 to 5 times higher than in females [1] [3].

The classification of goiters has been made by WHO ranging from stage I to stage III. Bulky goitre or goiter type III is defined as being visible more than five meters away. The semiological richness is the corollary of an increase in volume as well as its multi-nodular character. This increase causes compression at the tracheal, oesophageal, recurrent nerve and deep veins. This results in a clinical spectrum characterized by dyspnoea, dysphonia or even an upper vena cava syndrome [4].

These symptoms appear gradually and are life-threatening, especially when the development is intra-thoracic [5].

Imaging assessments, namely ultrasound, CT and chest and lateral radiography, form the bedrock of giant goiter management. They allow highlighting signs of malignancy, to weave the relation with the neighboring organs and to objectify an intrathoracic prolongation [1] [2].

Thyroid surgery has a privileged place in the treatment of multiple thyroid diseases, especially in cases of thyroid cancer, but also bulky nodule, compressive goitre, diving or toxic [6].

It is up to the surgeon to set up a protocol for surgical management. This requires a multidimensional approach [7].

The nosology of giant goiter remains a subject little discussed by the literature [6] [8]. Its management is a problem of integration efficiency in the recommendations on giant goiter as an entity. The multiplicity of the ratio of the thyroid gland with the other neighboring organs and the development of a giant goiter in this restricted cervical space is the corollary of the phenomenon of compression and difficult intubation [6] [8].

In view of the problem posed by the management of giant goiters by surgeons, we brought elements contributing to the rationalization of a therapeutic strategy that could contribute to the reduction of the postoperative complication rate.

2. Patients and Method

We conducted a descriptive and prospective study, involving a series of 30 cases of giant goiter, collected in the department of otorhinolaryngology and cervicofacial surgery (ENT and CCF) of CHU Mere Enfant Luxembourg, Bamako, over a period of 4 years from June 2015 to June 2018. We are based on the clinical and radiological criteria for the diagnosis of large goiters.

Have been included: Patients of all ages operated on for a large goitre at the ENT department of CHU Mère enfant luxembourg whose weight of the surgical specimen was greater than or equal to 500 mg. Patients whose mobility of the larynx is preserved preoperatively.

Have been excluded: Inapplicable files, Non operated patients, Thyroid cancers.

2.1. Variables Studied

- Sociodemographic status: age, sex, antecedent
- Clinical aspects: functional signs, physical signs
- Paraclinical data: biological assessment, Cervical ultrasound and CT
- Postoperative results: histological examination of the operative specimen
- Patients undergoing total thyroidectomy received thyroid hormone supplementation.

2.2. The Operative Technique

- All patients were operated under general anesthesia
- The approach was the classic route of thyroidectomy
- Opening of the white line
- Ligation of the vessels of the superior pole, Identification and preservation of the superior parathyroid
- Cricopharyngeal muscle exposure
- The recurrent nerve is searched after palpation of the small horn of the thyroid cartilage
- The nerve was dissected until it emerged in the chest; ligation of the branches of the inferior thyroid artery, identification and preservation of the lower parathyroid
- Depending on which part of the gland is affected by lobeisthmectomy or total thyroidectomy
- The closure was carried out in two planes

Analysis and data processing: An investigation sheet was established, the consent of patients was previously obtained to participate in the study. The data has been computerized using software specialized in statistical processing “SPSS

21.0 French version”, and the data entry on Word 2013.

3. Results

3.1. Epidemiological Aspects

The frequency: In 4 years we collected 30 cases of voluminous goitre, during this period we performed 180 thyroidectomies, a frequency of 16.67% of cases,

The mean age was 51.37 years with an extreme ranging from 37 to 65 years and a standard deviation of 7.97 (**Table 1**). Females were common in 66.7% of cases with a sex ratio 0.50.

3.2. Clinical Aspects

Reason for consultation: All patients consulted for cervical swelling.

The duration of evolution: The long duration of evolution was 40 years in one case the average duration was 18, 20 years.

The family history of goiter was found in 4 cases or 13.3%.

Signs of compression: The sign of compression was found in 85.7% (**Table 2**).

3.3. The Physical Examination

The physical examination found a mobile swelling, hard and painless in all patients is 100%, Goitre was unilateral in 26.7% of cases (**Figure 1**) and bilateral in 73.3% of cases (**Figure 2**). Endolaryngeal examination was normal in all patients, there was no cervical lymphadenopathy.

Table 1. The distribution of patients by age.

Age	Effective	Percentage %
[30 - 40]	2	6.67
[40 - 50]	12	40.00
[50 - 60]	8	26.67
[60 - 70]	8	26.67
Total	30	100

Table 2. Distribution of patients according to signs of compression.

Compression Signs	Effective	Percentage
Isolated dysphony	1	7.1
Isolated dysphagia	2	14.3
Isolated dyspnea	4	28.6
Dysphagia + dyspnea	4	28.6
Dysphagia + dyspnea + dysphagia	1	7.1
Total	25	85.7



Figure 1. Left thyroid swelling. 1—left lobe.



Figure 2. Bilateral thyroid tumefaction. 1—left lobe; 2—right lobe.

3.4. Paraclinical Aspects

The lower diving pole was found in 12 cases at CT, All our patients were euthyroid.

The classification of TIRADS 2 was found in 80.0% of cases, Filtration was not performed in any of our patients (**Table 3**).

3.5. Therapeutic Aspect

Surgical treatment: Total thyroidectomy was common in 50.0% of cases (**Table 4**).

Extreme weight was 500 g and 800 g with an average of 586.67 g and a standard deviation of 81.93 (**Figure 3**), The size of the largest workpiece was 14 cm, The internal jugular vein lesion was found in 8 cases, ie 26.7%, Colloid adenoma of the thyroid was found with 100% of cases.

The postoperative course: We noted a case of the hematoma of the box is 3.3%; 3 cases of the release of the operative wound is 10% and 2 cases the superinfection is 7.1%. Signs of hypothyroidism were common with 50.0% and

Table 3. Distribution of patients according to paraclinical examination.

Paraclinical examinations	Effective	Percentage
CERVICAL CT	12	40.0
CERVICAL ULTRASOUND	30	100.0
TSH us-T4	30	100.0

Table 4. Distribution of patients by type of surgery.

Surgical treatment	Effective	Percentage
Right Loboisthmectomy	3	10.0
Left Loboisthmectomy	5	16.7
Subtotal thyroidectomy	7	23.3
Total thyroidectomy	15	50.0
Total	30	100.0

**Figure 3.** Operative part of a total thyroidectomy weighing 800 g.

hypocalcemia in 26.7% of cases, Postoperative nasofibroscopy found good vocal fold mobility in all patients.

4. Comments and Discussion

4.1. Socio-Epidemiological Aspects

During 4 years we realized in the ENT and CCF Department of the Mother-Child Hospital Luxembourg 180 thyroidectomies including 30 cases of voluminous goitre, a frequency of 16.67% of cases.

The frequency of large goiters is poorly reported in the literature [9], The few reported cases concerned clinical cases not reporting the frequency of giant goiters within goiter. This observation highlights the rarity of cases of giant goiter unlike our series, In the West they are rare because of the early consultations of

patients [10].

The average age of our patients is close to that of *MAKEIEFF M* who was 60 years old [9], *KEITA MA* [11] and *KEITA I* did not share this finding, the average age of 40.9 years is lower than that of our series. The female predominance is the preserve of goitres reported by *KEITA MA* [11] and *MAKEIEFF M* [9].

The age of goitre progression according to *KEITA MA* [11] has been more than 20 years in 53% of cases and according to *MAKEIEFF M* has been 25% for 15 years, in 25% of cases for more than 30 years and in 25% of cases for less than a year. The long evolution time has been 40 years in our series.

4.2. Clinical Aspects

Clinical findings in our patients have revealed a mobile swelling. However, signs of compression such as dysphagia and dyspnea of decubitus due to the development of goitre have been reported in our patients as in other series [9], The characteristics of the swelling, the associated signs and the laryngeal mobility make it possible to direct the ENT surgeon to make histological hypotheses,

The family history of goiter was found in 4 cases, or 13.3%, unlike the *KEITA I* series which reported 13.7% [12], In front of this antecedent one must look for the medullary carcinoma, a deficiency in iodine [5].

4.3. Paraclinical Aspects

Paraclinical explorations of large goiters are based on tomodensitometry, thyroid echography, and thyroid hormone testing [5], The cervico-mediastinal computed tomography performed in our case according to the signs of compression made it possible to determine the relation with the vasculo-nervous axis and the plunging nature of the goitre (**Figure 4**). She has been an indicator in the recurrence for the surgeon.

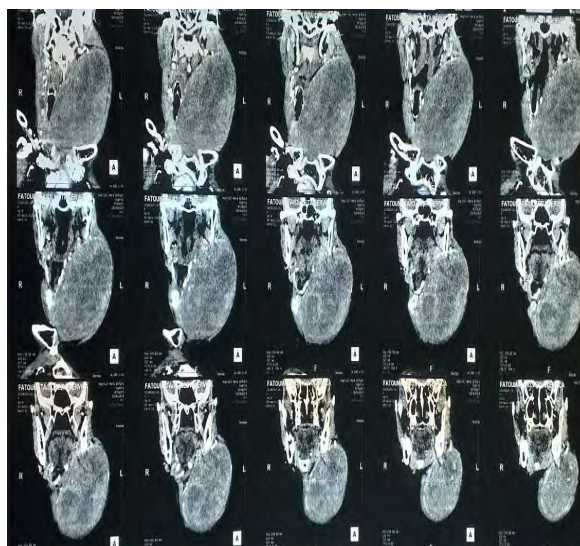


Figure 4. CT of thyroid swelling developed at the expense of left lobe.

Computed tomography has not been systematic in the MAKEIEFF M series, it has made it possible to recover the plunging character of goiter as well as MRI [9]. The esogastroduodenal transit was indicated by MAKEIEFF M in cases of goitre associated with dysphagia [9], Computed tomography was performed in four (4) cases corresponding to diving goitres.

Cervico-mediastinal CT is part of the extension assessment of thyroid cancers and large and/or plunging goitres [1] [5], MRI has several strengths: excellent tissue contrast; no interference of gadolinium with thyroid function and isotopic explorations. These indications of choice are therefore: precise exploration in case of goiter goiter; the extension assessment of thyroid cancers; the search for post-surgical tumor recurrence [5].

The ultrasound criteria were of a contribution in the management of giant goiters, giving the criteria of malignancy or benignity according to the classification TIRADS.

The main criteria predicting malignancy: are the solid character and hypoechoic appearance, micro-calcifications, irregular contour or fuzzy boundaries, absence of a peri-nodular halo, nodule higher than broad, intra-nodular vascularization. It is important to note that for the moment, none of these studies has made it possible to define the relative importance of these different criteria [5] [13].

4.4. Therapeutics Aspects

➤ Access way and type of thyroidectomy

All our patients were operated under general anesthesia. The approach was an exclusive anterior cervicotomy. Total thyroidectomy was the most frequent indication with 50.0% in our case as in the series of KEITE A who reported 60% of cases [14] and in the series MOULOUDI L and MAHMOUDI H who reported 89% of cases [15], In the BENBAKH M. and al series, total thyroidectomy in 98% [16], In other series the thyroidectomy was partial [17]. Ultrasound data based on the TIRADS classification guided our therapeutic indications.

In the MAKEIEFF M series the mean weight of goiter was 175 grams with a maximum of 800 grams and the size was between 6 and 15 cm for the largest [9],

In the BENBAKH M et al series, the average weight of goiters was 205 grams with a maximum of 820 grams. The size was between 5.3 cm and 19 cm for the largest [16]. For Koumare AK; the average weight of goitres was 320 grams [17]. These data are close to those of our patients. In patients with signs of compression in our series, goitre was voluminous. The same observation has been noted in some authors [9].

The volume of goitre can change the operative sequence. The problems associated with diving and giant goitre are of a recurrent and parathyroid nature. Prevention of recurrent morbidity is imperative [5].

4.5. Operating Incidents

In giant goiters, the exteriorization of the gland towards the midline to perform the recurrent search is difficult. This act is responsible for stretching and nerve

traction. The retrograde pathway was the main mode of dissection. In the absence of a recommendation on this subject we prioritized it. Several authors agree that the recurrent approach sought is the retrograde pathway in cases of giant goiter, diving and in cases where the classical path is impossible [18], It always allows to locate the nerve without stretching,

Thyroid surgery is the prerogative of the complications we have identified cases of jugular injury, These are goitres that compressed the vasculo-nervous axis with adherence to a thyroid capsule, Intraoperative haemorrhage was observed in the KOUMARE AK series in 12% [17], Several factors explain the hemorrhagic risk of giant goiters. These include hypervascularization of the thyroid parenchyma, more pronounced dilation of the peripheral vessels, the very close relationship with the jugulocarotidian axis and overflow on the aortic arch [6] [17].

➤ Postoperative follow-ups

Final recurrent paralysis and hypocalcemia were noted in the KOUMARE AK series. In our case, no definitive recurrent and parathyroid lesions were noted. Hypocalcemia varies in the literature between 1.6% to 50% according to JAFARI M [19]. Whether transitory or definitive, is a usual complication [6], It occurs as a result of parathyroid parenchymal excision and devascularization of the parathyroid glands at the time of dissection. Hypocalcemia was transient in 7.1% in our series.

The operative sequences in some cases were enamelled with hypothyroidism. Total thyroidectomy exposes the same mortality and morbidity risks as subtotal and prevents the risk of tumor recurrence [20], In our series hypothyroidism following total thyroidectomy is the illustration of treatment nonobservance due to low income of the population.

The benign histological nature concerned the colloid adenoma with 100% of cases. This histological aspect corroborates with that of MAKEIEFF M [9] MOULOUDI L and MAHMOUDI H which reported 97.46% [15] contrary to the series of KEITA I [12] which found colloid adenoma in 63.8% of cases.

5. Conclusion

The large goiters have become rare because of the early management of thyroid nodule. They impose surgical excision most often cervical in our context. A systematic clinical and radiological examination makes it possible to make the diagnosis. Its management must allow the prevention of recurrent and parathyroid morbidity.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

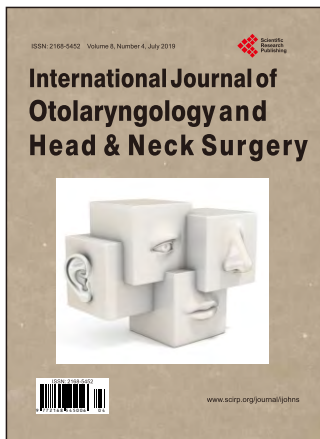
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