

## Analysis of theoretical knowledge and the practice of science among brazilian otorhinolaryngologists

Vitor Rosa Ramos de Mendonça<sup>1</sup>, Thiago Alcântara<sup>2</sup>, Nilvano Andrade<sup>3</sup>, Bruno Bezerril Andrade<sup>4</sup>, Manoel Barral-Netto<sup>5</sup>, Viviane Boaventura<sup>6</sup>

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### Abstract

Physicians from all medical specialties are required to understand the principles of science and to interpret medical literature. Yet, the levels of theoretical and practical knowledge held by Brazilian otorhinolaryngologists has not been evaluated to date.

**Objective:** To assess the background and level of scientific knowledge of Brazilian otorhinolaryngologists.

**Method:** Participants of two national ENT meetings were invited to answer a questionnaire to assess scientific practice and knowledge.

**Results and Conclusion:** This study included 73 medical doctors (52% otorhinolaryngologists and 38% residents) aged between 18 and 65 years. About two-thirds have been involved in some form of scientific activity during undergraduate education and/or reported to have written at least one scientific paper. Physicians who took part in research projects felt better prepared to interpret scientific papers and carry out research projects ( $p = 0.0103$  and  $p = 0.0240$ , respectively). Respondents who claimed to have participated in research or to have written papers had higher scores on theoretical scientific concepts ( $p = 0.0101$  and  $p = 0.0103$ , respectively). However, the overall rate of right answers on questions regarding scientific knowledge was 46.1%. Therefore, a deficiency was observed in the scientific education of Brazilian otorhinolaryngologists. Such deficiency may be mitigated through participation in research.

<sup>1</sup> PhD student.

<sup>2</sup> MD, ENT (MD, ENT, Santa Casa de Misericórdia da Bahia - Santa Izabel Hospital).

<sup>3</sup> MD, ENT, PhD (Coordinator of the Medical Residency Program, Santa Casa de Misericórdia da Bahia - Santa Izabel Hospital).

<sup>4</sup> MD, PhD (Clinical Research Fellow, Laboratory of Parasitic Diseases, National Institute of Allergy and Infectious Diseases, National Institutes of Health).

<sup>5</sup> MD, PhD (Full Researcher, Gonçalo Moniz Research Center - FIOCRUZ/BA; Full Professor, Department of Pathology, School of Medicine, Federal University of Bahia).

<sup>6</sup> MD, ENT, PhD (Preceptor, ENT Residency, Santa Izabel Hospital; Adjunct Professor, Department of Pathology, School of Medicine, Federal University of Bahia).

Gonçalo Moniz Research Center - FIOCRUZ/BA and Federal University of Bahia.

Send correspondence to: Viviane Boaventura. Rua Waldemar Falcão, nº 121. Candeal. Salvador - BA. Brazil. CEP: 40296-710.

Tel: (71) 3176-2259. E-mail: vsboaventura@gmail.com

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## INTRODUCTION

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Knowledge of scientific method and literature interpretation play an important role in the professional training of any medical specialty. The number of publications has grown as a reflex of the generation of new knowledge to be incorporated to medical practice. In order to keep up with the most current practices and ensure proper delivery of care, physicians need to understand the process of science production, to review it critically, and to apply scientific information rationally<sup>1</sup>. Physicians with experience in science can correctly interpret the literature to choose the best therapies for their patients and participate in research efforts to further the development of new approaches, therapies, and disease prevention methods<sup>1</sup>.

The undergraduate level education provided to physicians in Brazil lacks scientific training. Most medical students in Brazil do not take part in scientific research. According to Oliveira et al.<sup>2</sup>, only 12% of the students of six Brazilian medical schools have carried out research as part of their undergraduate studies. Involvement with research encourages medical students to follow careers in science and to carry out graduate level research<sup>3</sup>.

There is very little information on the type and quality of research training provided during medical specialization. In a family medicine residency program, the residents who underwent training on research acknowledged the value of the instruction they received for the therapy decision-making process<sup>4</sup>. However, only a small portion of the residents consider taking up a career on research or going to graduate school<sup>5</sup>.

The literature features no publications on the quality of ENT training in Brazil, despite the importance of scientific experience and knowledge for the practice of medicine<sup>1</sup>. This study aimed to assess the theoretical and practical knowledge of scientific research of ENT residents and physicians.

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## METHOD

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### Study design and participants

This is a cross-sectional study on the knowledge and practice of science among ENT physicians and residents in Brazil. The questionnaire used by Reis-Filho et al.<sup>6</sup> on undergraduate students of Medicine and Law was adapted for physicians specialized on ENT care. The questions on scientific knowledge and practice were kept, and questions on workplace, time since graduation, and on whether the respondent was a physician or a resident were added. Participants of two national otorhinolaryngology meetings held in 2009 and 2010 were randomly invited to join the study and answer the questionnaire. The questionnaires were answered by the respondents as they visited our booth at the meetings. Volunteers were asked to answer

the questionnaire only once. All questions had to be answered for the questionnaire to be included in the study. Respondents were not asked to identify themselves. The study was approved by the Research Ethics Committee (permit 361/2011).

### The questionnaire

Participants were asked to answer questions (Annex 1) on age, gender, and participation in undergraduate research projects, in addition to six multiple choice questions covering basic concepts of scientific method, statistics, and the structure of a scientific paper<sup>6</sup>. Questions to assess the respondents' ability to interpret and write scientific papers, and to plan and conduct research projects were also included.

### Data analysis

Responses were categorized based on previous participation in undergraduate research projects, difference in theoretical scientific knowledge and subjective assessment in relation to previously written papers, and time since graduation. The multiple choice questions were expressed as a percentage of right answers. Differences were analyzed using Fisher's exact test. The Mann-Whitney test was used to calculate the mean theoretical performance of each group based on the mean number of right answers per individual in the six multiple choice theoretical questions. Software program GraphPad Prism<sup>®</sup> 5.0 was used in data analysis. Statistical significance was attributed to events with  $p < 0.05$ .

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## RESULTS

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### Participant profile

Seventy-three physicians were enrolled in the study. Most were males (62.5%;  $n = 45$ ), aged between 26 and 35 years (62.9%;  $n = 44$ ), and graduated for 10 years or less (66.7%;  $n = 48$ ). About 52% ( $n = 38$ ) were specialist ENT physicians and 38% ( $n = 28$ ) were ENT residents. (Table 1). Most of the respondents participated in undergraduate research (76.5%;  $n = 52$ ) and/or wrote at least one scientific paper (78.4%;  $n = 40$ ) (Table 1).

### Science theoretical concepts

A mean of 46.1% of the responses to the six multiple choice questions designed to assess general concepts pertaining to research and applied sciences were right. Only 21.92% ( $n = 16$ ) of the respondents answered correctly the question on the definition of scientific hypothesis, whereas about a third knew how to cite references (31.08%;  $n = 23$ ) and how a scientific paper is structured (32.43%;  $n = 24$ ) (Figure 1). Most participants gave right answers on the process of writing the introduction to a paper, on

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