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A Preliminary Vietnamese Comparative Study of Postgraduate Radiological Thesis Characteristics

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ABSTRACT

Introduction: Each country has its system of the training program, but to be concordant with the world in the radiology field, the process needs to have common points or common criteria. On maintaining the integrity of intersociety collaboration in the field of radiology, it is necessary to understand each country's training program for each specialty. **Aim:** This retrospective study aims to compare the postgraduate thesis characteristics from various sources in the field of radiology. **Methods:** This was a retrospective study evaluating data that is publicly available online and at libraries and institutional review board approval, as such, was not demanded. We selected 40 published theses from the library of Pham Ngoc Thach University of Medicine and University of Medicine and Pharmacy at Ho Chi Minh City and Hanoi Medical University in Vietnam which graduated from 2008 to 2018. Of these, there were 10 PhD, 10 specialists II, 10 master's, and 10 residency theses selected. **Results:** A total of 40 theses were analyzed from participants with a median age of 36.5. The male/female ratio was 23/17. Most of the theses were subspecialty in diagnostic radiology (87.5%) and focused on pathological radiology (95%). Adult patients were the major objectives of the theses accounted for 87.5% with predominant materials of magnetic resonance imaging counted for 47.5%. Theses in PhD group were the largest items regarding the total number of pages as well as the number of figures, and the number of references. Nonetheless, both domestic and international publications related to all theses were truly low. **Conclusion:** The postgraduate thesis of radiology in Vietnam has many different forms but mainly focuses on diagnostic and pathological radiology with materials of magnetic resonance imaging in adults. The number of international publications regarding the thesis was very small.

Keywords: Postgraduate thesis characteristics, radiology, Vietnam.

1. INTRODUCTION

Diagnostic imaging is a form of technology that has revolutionized the medical field in the past century. More specifically, by 1895, Wilhelm Conrad Röntgen invented the X-ray effect and achieved the Nobel Prize in Physics 1901 (1, 2). Allan M. Cormack and Godfrey N. Hounsfield jointly obtained the Nobel Prize in Physiology or Medicine 1979 with the development of computer-assisted tomography (1, 3). In 2003, Peter Mansfield and Paul C. Lauterbur shared the Nobel Prize in Physiology or Medicine 2003 with their development of magnetic resonance imaging (1, 4). Nowadays, almost all of the radiological studies have basically relied on these discoveries.

Radiologists are doctors who use these revolutionary technologies by executing and interpreting medical images to aid in the diagnosis and treatment of patients. Therefore, it is necessary to have postgraduate

training to improve scientific expertise and research capability in clinical practice after graduating from medical university (5). Each country has its own system of the residency training program, but to be concordant with the world in the radiology field, the process needs to have common points or common criteria. In the radiological postgraduate program, a master's degree program usually lasts for 2 years, whereas a doctoral degree (PhD) program lasts a minimum of 3 years (6-8).

In Vietnam, in addition to the postgraduate training programs managed by the Ministry of Education and Training, there is also a specialized training program for residency doctors, the specialist I and specialist II, which is managed by the Ministry of Health. The residency program lasts for 3 years, whereas specialist I and specialist II last for 2 years. Among them, only specialist I group does not require to complete a thesis,

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	Overall n = 40	PhD (1) n = 10	Specialist II (2) n = 10	Master (3) n = 10	Residency (4) n = 10	p	Post hoc§
Age (years)	36.50 (19)	43.50 (11)	46.00 (10)	29.00 (8)	27.00 (0)	< 0.001§	p1-3, p1-4 p2-3, p2-4
Gender						0.025§	
Female	17 (42.5%)	1 (10%)	3 (30%)	6 (60%)	7 (70%)		
Male	23 (57.5%)	9 (90%)	7 (70%)	4 (40%)	3 (30%)		
Course duration (years)	3 (2)	5 (2)	2 (0)	2 (0)	3 (0)	< 0.001§	p1-2, p1-3 p1-4, p2-4
Subspecialty						0.104	
Diagnostic radiology	35 (87.5%)	7 (70%)	8 (80%)	10 (100%)	10 (100%)		
Interventional radiology	5 (12.5%)	3 (30%)	2 (20%)	0 (0%)	0 (0%)		
Focus						0.511	
Pathological radiology	38 (95%)	10 (100%)	9 (90%)	9 (90%)	10 (100%)		
Anatomical radiology	2 (5%)	0 (0%)	1 (10%)	1 (10%)	0 (0%)		
Objective						0.473	
Adult	35 (87.5%)	9 (90%)	8 (80%)	8 (80%)	10 (100%)		
Children	5 (12.5%)	1 (10%)	2 (20%)	2 (20%)	0 (0%)		
Region							
Head-neck	20 (50%)	6 (60%)	4 (40%)	2 (20%)	8 (80%)	0.122	
Thorax	7 (17.5%)	1 (10%)	2 (20%)	2 (20%)	0 (0%)		
Abdomen	12 (30%)	3 (30%)	2 (20%)	5 (50%)	2 (20%)		
Extremity	1 (2.5%)	0 (0%)	0 (0%)	1 (10%)	0 (0%)		
Modality						0.084	
Magnetic resonance imaging	19 (47.5%)	6 (60%)	3 (30%)	2 (20%)	8 (80%)		
Computed tomography	15 (37.5%)	2 (20%)	4 (40%)	7 (70%)	2 (20%)		
Digital subtraction angiography	4 (10%)	2 (20%)	2 (20%)	0 (0%)	0 (0%)		
Ultrasound	2 (5%)	0 (0%)	1 (10%)	1 (10%)	0 (0%)		
Study design						< 0.001§	
Retrospective	26 (65%)	1 (10%)	8 (80%)	8 (80%)	9 (90%)		
Prospective	14 (35%)	9 (90%)	2 (20%)	2 (20%)	1 (10%)		
Data collection duration	2.50 (2.5)	3.00 (1.9)	1.50 (1.1)	3.25 (3.8)	1.50 (1.5)	0.024§	
Sample	60.50 (73)	102 (65)	65.50 (77)	52.50 (71)	48.50 (34)	0.079	p1-4

Table 1. Comparison of basic characteristics among four thesis types. § Statistically significant

which is an item considered to be the most important in the training process to finally graduate (8).

On maintaining integrity of intersociety collaboration in the field of radiology, it is necessary to understand each country's training program for each specialty.

2. AIM

Therefore, to introduce the basic features of the radiology training program in Vietnam, we conduct this study to compare the postgraduate thesis characteristics from various sources in the field of radiology.

3. MATERIALS AND METHOD

This was a retrospective study evaluating data that is publicly available online and at libraries and institutional review board approval, as such, was not demanded. We selected 40 published theses from the library of Pham Ngoc Thach University of Medicine, Hanoi Medical University, and University of Medicine and Pharmacy at Ho Chi Minh City in Vietnam which graduated from 2008 to 2018. Of these, there were 10 PhD, 10 specialists II, 10 master's, and 10 residency theses selected.

The data collection includes author age and sex, time from beginning to graduation, subspecialty (diagnostic radiology or interventional radiology), field of the study (pathological radiology or anatomical radiology), objective (adults or children), imaging modality, body region to study, study design (retrospective or prospective), data collection duration, and sample size. The main characteristics of these theses were described by the quantitative variables such as the number of pages, number of figures, number of diagrams, and number of tables. The publication outcome included both domestic and international publications.

The quantitative data were described in the form of median (interquartile range) and compared among four groups by Kruskal–Wallis test. Post hoc test was utilized to compare within groups. The qualitative data were described using frequency and percentage and compared by Chi-square test or Fisher's exact test if appropriate.

The SPSS version 23.0 (IBM Corp., Armonk, Newyork, USA) was used for statistical analyses. A *p*-value of less than 0.05 is considered to be statistically significant.

	Overall n = 40	PhD (1) n = 10	Specialist II (2) n = 10	Master (3) n = 10	Residency (4) n = 10	p	Post hoc§
Title words	19.50 (9)	26.50 (6)	21.00 (9)	16.50 (4)	17.00 (5)	0.006§	p1-3, p1-4
Aim	2.00 (0)	2.00 (0)	2.00 (0)	2.00 (0)	2.00 (0)	0.081	
Table	28.00 (13)	35.00 (12)	27.00 (14)	22.00 (16)	27.50 (15)	0.055	
Diagram	9.00 (9)	10.50 (8)	5.50 (5)	8.50 (8)	15.50 (14)	0.008§	p2-4
Figure	22.00 (10)	35.00 (16)	22.00 (12)	21.00 (14)	21.00 (7)	0.003§	p1-2, p1-3 p1-4
Introduction	2.00 (1)	2.00 (0)	2.00 (0)	3.00 (0)	2.00 (1)	< 0.001§	p1-3, p2-3
Literature review	31.50 (12)	39.50 (11)	28.50 (10)	27.00 (14)	27.50 (9)	0.001§	p1-2, p1-3 p1-4
Materials and method	13.00 (9)	17.50 (6)	14.00 (5)	7.50 (6)	10.50 (8)	0.001§	p1-3, p1-4 p2-3
Results	21.00 (8)	31.50 (11)	18.00 (5)	16.50 (8)	22.00 (8)	< 0.001§	p1-2, p1-3
Discussion	23.50 (9)	37.00 (7)	21.00 (4)	19.00 (9)	24.50 (8)	< 0.001§	p1-2, p1-3 p1-4
Conclusion	2.00 (0)	2.00 (0)	2.00 (1)	2.00 (1)	2.00 (0)	0.301	
Pages	90.50 (35)	130.00 (16)	85.50 (11)	72.00 (28)	87.50 (17)	< 0.001§	p1-2, p1-3 p1-4
References	84.50 (60)	139.50 (30)	85.50 (25)	53.00 (51)	61.00 (24)	< 0.001§	p1-2, p1-3 p1-4, p2-4

Table 2. Comparison of main characteristics among four thesis types. § Statistically significant

	Overall n = 40	PhD (1) n = 10	Specialist II (2) n = 10	Master (3) n = 10	Residency (4) n = 10	p	Post hoc§
Domestic publication	1.00 (2)	2.50 (2)	0.00 (0)	0.50 (2)	1.00 (0)	< 0.001§	p1-2, p1-3, p2-4
International publication	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.392	

Table 3. Comparison of publications derived from thesis among four thesis types § Statistically significant

4. RESULTS

Basic characteristics

A total of 40 theses were analyzed from participants with a median age of 36.50. The male/female ratio was 23/17. The median time to finish the training program was 3 years. Most of the theses were subspecialty in diagnostic radiology (87.5%) and focused on pathological radiology (95%). Adult patients were the major objectives of the theses accounted for 87.5%. Magnetic resonance imaging, computed tomography, digital subtraction angiography, and ultrasound were used as the main research materials counted for 47.5%, 37.5%, 10%, and 5%, respectively. The other characteristics of participants were shown in Table 1. There were differences among four groups of age, course duration, study design, and data collection duration.

Main characteristics

Table 2 shows the main characteristics of the theses among four groups. PhD group was the largest item in the total number of pages as well as number of tables, number of figures, and number of references, followed

by residency, specialist II, and master groups, respectively.

Publication outcome

Regarding publication outcome, Table 3 shows that only PhD group produced more articles for domestic publications than the rest. It is noted that there were only 2 international papers related to PhD theses. By contrast, none of specialist II authors had their results submitted to both the domestic and international journals.

5. DISCUSSION

During the retrospective review of 40 postgraduate theses, we noted the following outstanding results with a gender imbalance of candidates in the radiology field of training, especially in the field of interventional radiology. The studies focused on body region of the head and neck regarding pathology in adults. The doctoral thesis was the greatest one in structure, but the number of international publications related to doctoral theses in Vietnam was limited.

The median age of all candidates in four groups was 36.50 years. Of which, the age in the PhD and specialist II

groups were significantly higher than in the master and residency groups. Specialist II is the highest education level of the Ministry of Health, whereas doctoral is the highest educational level of the Ministry of Education and Training. This result is suitable to reality in Vietnam because to pass the examination for specialist II or doctoral program, the candidates must previously complete some of courses such as residency, specialist I, or master program (8).

In general, males dominate over females at a ratio of 1.35/1. Male candidates are more in PhD and specialist II groups but less in master and residency group compared to females, respectively. This result is consistent with other studies in most countries because there is a gender imbalance in radiology field, especially in radiology of intervention (9-11).

The retrospective study was dominant in most of the four groups, but only the PhD group conducted studies with the prospective design. Among the four groups of topics, most of them focus on the diagnostics and pathology of the head and neck in adults. For PhD and residency groups, the research usually used magnetic resonance as the material, whereas the specialist II and the masters studied with computerized tomography. In this study, the proportion of the topic regarding interventional radiology was very low statistically compared to diagnostic radiology. There are very few studies with anatomical or diagnostic radiology in children compared to adults. These results are completely consistent with other research results in the world (1, 9-19).

The median time to finish the training program in all the candidates was 3 years and the median sample collection time was 2.5 years, in which the sampling time for PhD group was the longest, 3 years. The median sample size for all was 60.5 patients, of which the PhD group had the largest median sample size of 102. There was no difference in the number of goals and the number of tables among four groups. The PhD theses had more figures than the rest. The total number of pages, literature review, research methods, results, discussion, and references in the doctoral group were larger than in the other groups. There was no difference in the number of pages of conclusion among four groups. The median title length of the thesis was 19.5 words, in which the doctoral thesis has the longest title with 26.5 words. This is entirely appropriate because the PhD study was the longest, 5 years, and most of the theses were based on the prospective design. Furthermore, the literature review, research methods, results, and discussion are longer to interpret all the results of charts, together with illustrations of the research results. This result is consistent with the previous reports because doctoral degrees are the highest level of study in the field of research (6-8, 20, 21).

The median number of domestic publications related to all theses was 1 article. There were 53 national publications for all groups, in which the PhD group provided the most domestic publications with 2.5 articles. Only two international publications related to doctoral subjects were recorded. The proportion of international publications in PhD group was 0.2 articles per one thesis.

In Vietnam, doctoral subjects did not need to have international publications until 2017, but only two domestic publications were related to the topic before graduation. As for the criteria of graduation for specialist II, residency, and master's degree, the publication of national or international journals is not a compulsory criterion. Therefore, the number of domestic publications in doctoral group was the highest. Since 2017, doctoral candidates who considered to be successfully graduated are required to have articles published in journals indexed by the Web of Science and/or Scopus. Nevertheless, in this study, we have recorded doctoral thesis obtained before 2018, so the proportion of PhD students with international publication was very low and consistent with the reports of other authors (8, 22, 23).

The preliminary Vietnamese comparative study of postgraduate thesis characteristics in all four groups gives an overview of the situation of radiology training in Vietnam. Therefore, it can give directions to overcome problems that exist in education. The limitations of this study are retrospective research, small sample size, and single-center study. Furthermore, 40 objectives in this study cannot represent fully the radiological theses throughout Vietnam. A multicenter study with larger sample sizes and more information related to radiological theses should be conducted to offer a holistic view of both Vietnamese and global radiological training.

6. CONCLUSION

A graduation thesis of radiology in Vietnam has many different forms but mainly focuses on diagnostic and pathological radiology with materials of magnetic resonance imaging. The common body region to study was head and neck. There was a gender imbalance in radiology field in Vietnam. The number of international publications regarding the thesis was very low. In the future, it is necessary to have researches to follow further research of the graduation thesis to help Vietnam's Radiology integrate with the researches in the world.

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