

## Master's and doctoral theses in family medicine and their publication output, Suez Canal University, Egypt

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### ABSTRACT

**Background:** The completion of a thesis is a significant requirement for both a Master's and a doctorate degree in general practice/family medicine (GP/FM). A postgraduate thesis is a well-planned, time-intensive activity carried out over several years. The quality of the theses can be judged by the proportion of published papers. **Objective:** This study aimed to describe Master's and doctoral theses in family medicine and their publications between 1982 and 2014. **Materials and Methods:** GP/FM degree theses were reviewed at the Faculty of Medicine and central Suez Canal libraries. Several characteristics were extracted from each thesis relating to the main researcher, supervisors, themes, and study methods according to predefined criteria. Publications from the theses were described. **Results:** Over 33 years, 208 theses were completed by 173 GP/FM researchers. The majority of the theses were for Master's degrees (84.1%). Regarding the study design, most of the degree theses were cross-sectional studies (76.9%). The adult population was targeted in 33.7% of research theses. Nonprobability sampling was used in 51%. Rural communities were the setting of research in 43.8%, and primary health center (PHC)-based studies in 59.1%. The "Patient" category exceeded the other categories (28.4%). Publication from theses started in the second decade of research production. Of the degree theses, 21.6% original articles were published. Only 13.3% of articles from theses were published in PubMed-indexed journals. The researcher was first author in 62.2% of published articles. **Conclusion:** The production of GP/FM theses and their publications are going to increase. Continuous assessment and planning for GP/FM studies are recommended.

**Keywords:** Family medicine, general practice, medical journal Egypt, publication bias, research

### Introduction

The term "research" is included in the European definition of general practice/family medicine (GP/FM): An academic and scientific discipline with its own educational content, research, evidence base and clinical activity, and a clinical specialty orientated to primary care.<sup>[1]</sup> The era of evidence-based medicine (EBM) aims to apply evidence gained by a scientific method to change current medical practice. EBM stands on the foundation of research.<sup>[2]</sup>

In many ways, research is the root of family medicine. It is a vital component of what physicians do to care for patients.<sup>[3]</sup> Most research originates from academic departments of family medicine or from collaborative initiatives with researchers in developed countries. There is generally a paucity of researchers, resources, and expertise.<sup>[4]</sup> Research experience is valuable to the physician's evidence-based practice, as it imparts skills such as

literature search, collecting and analyzing data, and the critical appraisal of evidence.<sup>[5]</sup>

A postgraduate thesis is a well-planned, time-intensive activity carried out over several years. The amount of hard work and effort that goes into a thesis should not be restricted within the departmental and institutional libraries— rather, it should also reach the scientific community.<sup>[6]</sup> The quality of the theses can be judged by the proportion of published papers. One indicator of the scientific value of a thesis and its acceptability is publication in a peer-reviewed journal.<sup>[7]</sup> Publishing a journal article drawn from a completed thesis leads to career enhancement and personal satisfaction.<sup>[8]</sup>

The work that culminates in a thesis provides the basis for a professional journal article. However, writing a professional journal article differs from writing a thesis. Individuals who have completed a Master's thesis or equivalent should consider publication.<sup>[9]</sup> Previous studies performed in developed and developing countries suggest that the publication rate of theses is not very high and ranges 1.2-52.3%.<sup>[10]</sup>

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At Suez Canal University (SCU), the General Practice department started the postgraduate Master's degree (M.Sc.) program in 1980, and the first physicians from the program graduated in 1982. The doctorate program was established in 1986. The name of the department was changed to Family Medicine in 1995.<sup>[11]</sup> Before 1997, there had been no FM training program in Egypt except at SCU.<sup>[12]</sup> After more than three decades, the current study was made with the aim to describe the Master's and doctoral theses and their publication rates by GP/FM researchers at SCU between 1982 and 2013.

## Materials and Methods

This was an observational, descriptive study, and the required data were collected between May and November 2014.

### Research selection

- Master's and doctoral theses in GP and FM available in the libraries of SCU were reviewed. The theses of GP or FM researchers in other specialties and essays/reviews were excluded
- Published articles in medical journals were included based on the name of the main researcher of GP/FM theses, and the title of the published article that could be the same or share the GP/FM thesis in its theme. Articles published in 2014 that were produced from theses in 2013 were also included. Full-text articles were reviewed in either soft or hard copies. Commentaries, letters to the editor, and publications in conferences were excluded.

### Methods of search

- Theses were identified by using: (1) Manual search of thesis registries and (2) Electronic search of the SCU library website
- Published articles were identified as in the previous study by Abdulmajeed *et al.*:<sup>[13]</sup> (1) Manual search at the Faculty of Medicine-SCU library; (2) PubMed and Google search; (3) Both manual and internet searches at national university journal libraries and their websites for either soft or print copies.

### Data analysis

The data were extracted from theses and the published articles from the same entered into a computer and analyzed using a Statistical Package for Social Sciences program (SPSS, version 20, IBM, Chicago, USA). Data were presented using descriptive statistics in the form of frequencies and percentages for the qualitative variables and Microsoft Excel 2007 for presentation in graphs.

- The production of theses and their publications in medical journals were described over more than three decades. The number of theses and publications from theses each year was described.
- Theses were analyzed for their study designs:<sup>[14]</sup> Quantitative study designs were subdivided into observational studies (cross-sectional, case control, and cohort) and intervention studies, either with randomization (controlled randomized) or without randomization (including quasi-experimental, uncontrolled, and controlled nonrandomized).<sup>[15-17]</sup> Sampling techniques<sup>[18]</sup> were divided

into probability or nonprobability; geographical settings were described as a rural or an urban community. The community was further defined as primary health center (PHC), school, hospital, household, workplace, or social club. Population groups that were targeted by these studies were described

- The themes of theses were analyzed using five of the seven categories that were previously used in another study. These are:<sup>[14]</sup> (1) Clinical: Research related to diseases, prevention, prognosis, risk factors, and therapy; (2) Epidemiology: Research on the prevalence and incidence of diseases; (3) Family physician/Health service (FP-HS): Research related to consultations, physicians' knowledge, attitude, or behavior regarding health problems, prescribing, training health-care teams, quality of care, health-care utilization, and undergraduate education; (4) Guidelines: Research related to development, implementation, and adherence to guidelines; and (5) Patient: Research related to the patient's compliance, the role of family issues, a patient's knowledge, attitudes, or behavior regarding illness, patients' disease-related sociodemographic characteristics, or their quality of life. Research and remaining categories were not found within the studied theses. Additionally, the International Classification of Primary Care 2- English (ICPC 2-E) was used in the diagnoses of disease-related studies.<sup>[19]</sup> The themes or diagnoses of the theses might be multiple; the researchers included the one representing the major part of the study
- The researchers of the theses: The main researchers were analyzed for the total number of GP/FM researchers at SCU; the medical degrees of the researchers were registered as Bachelor of medicine (M.B.B.Ch.) or Master's degree (M.Sc.). Regarding the authorship of published articles, the order of the main researcher was described.
- Published articles from theses were analyzed for the following: Medical degree of the respective theses; whether regionally or nationally or internationally published; whether available on PubMed search, on journal websites, or in print only; the number of publications per one thesis; and the time between the completion and publication of a thesis.

## Results

Two hundred eight theses were reviewed at the SCU libraries. These works were completed over a period of 33 years. Figure 1 shows the numbers of theses and publications from theses. The publications from theses started in the second decade of research production and continue. Of all the theses, 5/41 (12.2%) were published in the second decade and 19/71 (26.7%) in the third decade.

### Theses characteristics

The study design of most degree theses (76.9%) was the observational cross-sectional study. A cross-sectional study design was most frequently chosen in Master's theses (89.6%). Interventions with randomization were mentioned in only 6.3% of all theses. Most of the intervention studies were mentioned in doctoral theses; nearly half of the doctoral theses (46.2%) included intervention without randomization, and only 23.1%

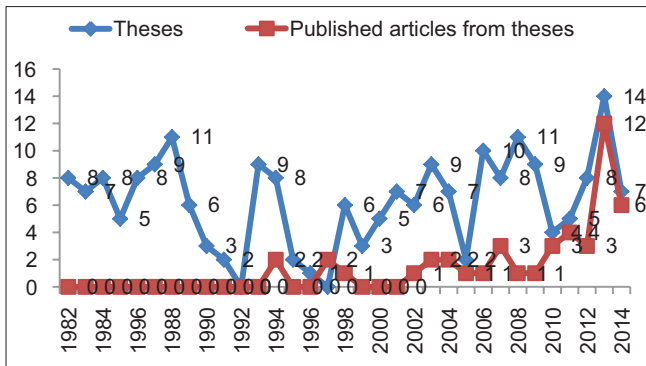


Figure 1: The annual production of theses and their publication output

mentioned intervention with random allocation to control groups. Of the research sampling techniques, nonprobability accounted for just over half (51%). On the other hand, 61.5% of the doctoral theses mentioned probability samples. Nearly one-third of the theses (33.7%) focused on adult populations, and a quarter of them (23.6%) on children and adolescents. Relatively more studies were carried out in rural (43.8%) than in urban communities (34.1%), but urban settings were mentioned more than rural ones in doctoral theses. More than half of the studies were carried out in PHCs (59.1%). With the exception of the Guidelines category, there was no major difference between the other four themes of research; the patient category (28.4%) was followed by FP-HS (25.5%) [Table 1].

Figure 2 shows that according to the diagnostic criteria of disease in International Classification of Primary Care, Second Edition (ICPC 2-E), general unspecified diagnosis represented one-fifth of the research, that is, 45/208 (21.6%), followed by endocrine, metabolic, and nutritional at 32/208 (15.4%), and pregnancy, childbearing, and family planning, at 24/208 (11.5%).

### Researchers' characteristics

One hundred sixty-seven family physicians completed 208 theses. The majority of researchers with M.B.B.Ch. (97.7%) produced Master's theses, while only 22.5% with M.Sc. degrees completed doctoral theses. More researchers completed one thesis on FM than those who completed two (83.2% vs 16.8%). Regarding the authorship of published theses, 62.2% of the main researchers were named first author, 8.9% second author, and 22.2% last author [Table 2].

### Publications from theses

The percentage of published articles from theses (1982-2014) was 21.6% of all degree theses over a period of 33 years of research production. Most of the published articles were from Master's theses (77.8%) and only 10 (22.2%) were from doctoral theses. Most of the published theses (68.9%) resulted in articles in national journals and 31.1% in regional/international journals. The majority of articles were published in journal websites (64.4%). Six out of 45 articles from theses (13.3%) were published in PubMed-indexed journals, 11.4% from Master's theses, and 20% from doctorate theses. There was a single

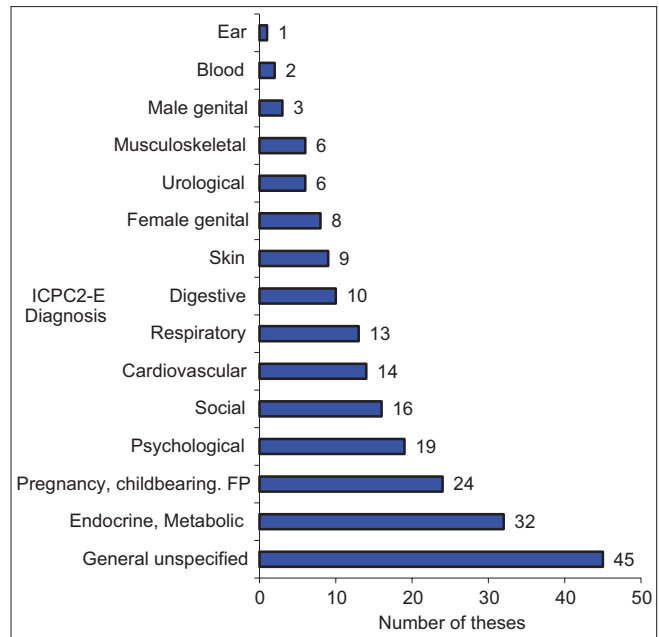


Figure 2: Diagnostic groups of degree theses according to International Classification of Primary Care, Second Edition (ICPC 2-E)

Table 1: Characteristics of Master's and doctoral theses

	Master's		Doctorate		All theses	
	n=169	%	n=39	%	n=208	%
Study Design						
Observational						
Cross-sectional	152	89.9	8	20.5	160	76.9
Case-control	8	4.7	3	7.7	11	5.3
Cohort	0	0	1	2.6	1	0.5
Intervention						
Intervention without randomization	5	3	18	46.2	23	11.1
Intervention with randomization	4	2.4	9	23.1	13	6.3
Study population						
Adult	55	32.5	15	38.5	70	33.7
Children	44	26	5	12.8	49	23.6
Women	32	18.9	9	23.1	41	19.7
Physician/health care team	30	17.8	6	15.4	36	17.3
Elderly	8	4.7	4	10.3	12	5.8
Sampling						
Nonprobability	91	53.8	15	38.5	106	51
Probability	78	46.2	24	61.5	102	49
Geographic setting						
Rural	76	45	15	38.5	91	43.8
Urban	54	32	17	43.6	68	34.1
Rural and urban	39	23.1	7	17.9	46	22.1
Community-based setting						
PHC	102	60.4	21	53.8	123	59.1
School	29	17.2	2	5.1	31	15.4
Hospital	14	8.3	9	23.1	23	11.1
Household	14	8.6	4	10.3	18	9.7
Workplace/elderly club	10	5.9	3	7.7	13	6.2
Theme category						
Patient	45	26.6	14	35.9	59	28.4
FP-HS	43	25.4	10	25.6	53	25.5
Clinical	36	21.3	11	28	47	22.6
Epidemiology	44	26	3	7.7	47	22.6
Guidelines	1	0.6	1	2.6	2	1

PHC: Primary health center, FP-HS: Family physician-Health service

publication from each of the 41 theses and two publications from two theses. Less than half of the published articles (42.2%) appeared in the year after the completion of the theses [Table 3].

### Discussion

The present study reviewed the print copies of 208 Master's and doctoral theses with 45 original research articles published from them. Other studies have assessed the quality of theses by postgraduate medical students,<sup>[7,20]</sup> but this study described the patients and methods of degree theses.

In the present study, the study design of most degree theses was found to be the cross-sectional study (76.9%). The selection of the cross-sectional study design in Master's theses could be related to many reasons: For instance, they can be used to generate hypotheses and ideas for further research using more rigorous study designs. In addition, cross-sectional studies are

relatively inexpensive and safe.<sup>[17,20]</sup> Doctoral theses on FM were fewer than Master's theses and this could be related to personal factors, as some of our academic members are abroad without completing their doctorate programs. On the other hand, a doctoral degree is only allowed for the academic members. Intervention designs were chosen mostly in doctoral theses, as more time and experience are required for them. High-quality studies as randomized controlled interventions were mentioned in 5% of all studies. These are expensive, and more funding might be necessary to realize more such trials.<sup>[21]</sup> In Egypt, the research in FM is developing but mostly not funded.

Half of the research sampling was either consecutive or convenience nonprobability samples. Despite the drawbacks of nonprobability sampling, the method can be useful when descriptive comments about the sample itself are desired.<sup>[22]</sup> In addition, this type of sampling explains the other finding that 59.1% of studies were carried out in PHCs, as it is quick, inexpensive, and convenient in the context of such centers. Adults (33.7%) comprised the study populations in all research theses. A possible explanation is that most chronic disease studies are confined to adult populations. More studies were carried out in rural (43.8%) than in urban (34.1%) communities. This finding is explained by the fact that seven out of 10 training centers at SCU serve rural communities.

Except for the Guidelines category, there was no major difference between the other four themes of research; the patient category accounted for 28.4%, followed by FP-HS at 25.5%. According to the diagnostic criteria of disease ICPC 2-E, a variety of topics were searched. General, unspecified diagnosis represented one-fifth of the research (21.6%), which could be related to studying PHC service within the FP-HS category; this was followed by endocrine, metabolic, and nutritional (15.4%) research, and then pregnancy, childbearing, and family planning (11.5%), the diagnoses of which are related mostly to the patient category.

The study by Kovacević *et al.* in Croatia showed a growing trend in the number of articles from Master's theses and doctoral dissertations dealing with health system research over a period of 20 years between 1990 and 2010.<sup>[23]</sup> In a German study, 55.5% of the published articles on GP were in the HS research category and the diagnostic groups according to ICPC 2 showed a variety of diagnoses, with psychological/psychosomatic accounting for 22.9% and cardiovascular for 21.6%, while the general unspecified topics accounted for only (2%).<sup>[19]</sup> Although these findings were from the published articles, they could reflect their original research themes. Diagnostic criteria differ from one country to another, which was expected and may be related to the different prioritization of different health problems in different communities.

The vast majority of researchers accomplished only one study per researcher within the GP/FM department (97.7%). On the other hand, only 22.5% completed doctorate theses. There were four researchers who completed only their doctoral theses in the department, and this explains the difference between the number

**Table 2: Characteristics of Master's and doctoral researchers**

	n=173	100%
<b>Total postgraduate researchers</b>		
Researchers with M B B Ch.	169	97.7
Researchers with M.Sc.	39	22.5
Number of theses/researcher		
One thesis	173	83.2
Two theses	35	16.8
<b>Order of main researcher/45 published articles</b>	<b>n=45</b>	<b>100%</b>
First author	28	62.2
Second author	4	8.9
Third author	1	2.2
Fourth author	2	4.4
Last author	10	22.2

**Table 3: Characteristics of publications from Master's and doctoral theses**

Published articles	Master's		Doctorate		All theses	
	n=35	%	n=10	%	n=45	%
National/international						
National	23	65.7	8	80	31	68.9
Regional/international	12	34.3	3	20	14	31.1
Article search						
PubMed-indexed journal	4	11.4	2	20	6	13.3
Journal website/not PubMed	25	71.4	4	40	29	64.4
Print only	6	17.1	4	40	10	22.2
Publications based on 1 thesis						
Single publication/thesis	33	94.3	8	80	41	91.1
2 publications/thesis	2	5.7	2	20	4	8.9
Time between thesis completion and publication						
Within the same year	6	17.1	4	40	10	22.2
1 year	13	37.1	6	60	19	42.2
2 years	7	20	0	0	7	15.6
3 years	4	11.4	0	0	4	8.9
4 years	2	5.7	0	0	2	4.4
6 years	2	5.7	0	0	2	4.4
7 years	1	2.9	0	0	1	2.2

of researchers (35) who completed two theses and the number of researchers who completed their M.Sc. theses (39). There is only one mandatory research that ends with writing of theses as a requirement for each postgraduate degree (Master's or doctorate). Regarding authorship, a Master's/doctoral candidate was the first author named in 62.2% of the published articles, while the supervisor was first author in 37.8%. These results were lower than those from the Arriola-Quiroz *et al.* study,<sup>[24]</sup> in which the medical students were first authors in 83.5% of the articles, but higher than those from the Dhaliwal *et al.* study,<sup>[25]</sup> in which the candidate was the first author listed in only 44% of papers, while the supervisor was named first in the rest (a majority) of the papers. In Finland, on reviewing diploma theses, the student was found to be the first author named in 30 articles (49.2%), the second author in 21 (34.4%), and the third- or later-mentioned author in 10 (16.4%).<sup>[7]</sup>

First and last authorship issues vary in evaluation. The first authorship of the supervisors could be related to many factors: The student rarely has the skills or knowledge necessary to conceptualize and design a study, and authorship credit could also be determined by degree of scientific or professional contribution.<sup>[25]</sup> Other institutions consider the last author named to be the principal author.

The published articles from theses in medical journals comprised 22.4% of all studied theses. In terms of the relationship between published article and degree of the original thesis, 77.8% articles were from Master's theses and 22.2% from medical doctoral theses. Previous studies<sup>[25-27]</sup> had revealed a low rate of publication from biomedical theses. The French study by Salmi *et al.*,<sup>[26]</sup> revealed that only 17.0% of theses were published. Caan and Cole found that the research evidence associated with doctoral degrees is often left unpublished, across many settings.<sup>[27]</sup> Other studies explained the low publication rates by factoring in the possibility of researchers' workload of teaching, routine professional obligations, and financial obstacles preventing publication.<sup>[25]</sup> Although in the FM department at SCU Master's theses mainly serve an educational purpose for the junior researchers, it could also prove their research and writing skills to the supervisors (lecturers/assistant professors) with their subsequent publication. Master's degree theses are often less complicated and less time-consuming, which makes their publication faster than medical doctoral theses.

Of all published theses, 68.9% were published in national journals and 31.1% in regional/international journals. Similar findings were mentioned in a Peruvian study, where most of the published theses (80%) were published in Spanish and in Peruvian journals and 17 theses (20%) were published in foreign journals (with all of them indexed in MEDLINE).<sup>[24]</sup> The Indian study<sup>[25]</sup> mentioned that of the published theses 23% resulted in papers in national journals and 67% in international journals. The choice of journal could be influenced by such factors as the following: The need to reach an appropriate academic audience; the time between submission of a paper and its subsequent publication; and the level of academic credibility of the journal, often assessed by Impact Factor.<sup>[28]</sup>

Six out of 45 (13.3%) articles from theses were published in PubMed-indexed journals, of which four (11.4%) were from Master's theses and two (20%) from doctorate theses. In addition, the published articles on journal websites accounted for 64.4%. These findings were nearly similar to the Croatian study by Frković *et al.*, in two University Schools of Medicine, which found that articles among Master's theses, 13% in Rijeka and 14% in Zagreb were published on MEDLINE, while among articles from Doctor of Philosophy (Ph.D.) theses, 11% in Rijeka and 41% in Zagreb were.<sup>[29]</sup> These results were less than those from the Indian study; the rate of publication in PubMed-indexed journals for papers derived from postgraduate theses is 30%. Dhaliwal *et al.* mentioned that PubMed publication could be a marker of the visibility to scientific communities,<sup>[25]</sup> on the other hand, publication in PubMed journals could be related to the scope of the journal and the quality of the submitted manuscripts.

The present study found that 91.1% of all theses resulted in single publication and only two theses (8.9%) resulted in two publications per thesis. Additionally, the Croatian study by Frković *et al.* found that most of the theses resulted in a single publication (95%), only 5% in two, and 0.4% in three publications.<sup>[29]</sup> There is a dilemma regarding multiple publications from one thesis, as some consider that the quality of a thesis can be judged by the number of published papers associated with it.<sup>[7,30]</sup> However, there are standard requirements for the submission of manuscripts to biomedical journals, and repetitive publication originating from a single research project indicates scientific misconduct.<sup>[31]</sup>

Of all published articles from theses, 42.2% appeared in the year after thesis completion. The results were consistent with the Indian study, where most of the publications from theses in an Indian institution appeared in the year after completion of the postgraduate course.<sup>[25]</sup> The French study found that 27% of theses appeared in print in the first year and nearly 50% after two years.<sup>[26]</sup> At SCU, the delay in publication could be related to the fact that such publication is not obligatory as in other countries,<sup>[25]</sup> or the suitable time for the supervisors to present their works to the scientific community. On the other hand, some journals had a longer time interval between the acceptance and publication of certain topics within their scope.

The publications from theses started in the second decade of research production and continue: 12.2% of theses were published in the second decade and 26.7% in the third decade. In the first decade of research production, most of the postgraduate general practitioners were not academic, and as publication is one of the requirements for advancement and promotion in an academic career, the academic staff started their publications in the second decade.

The researchers could not find published articles related to theses and their publications on FM, so the discussion was based on studies related to biomedical theses in general. Other manuscripts from the studied theses may be still unpublished at the time submission of the current paper.

## Conclusion and Recommendations

Master's and doctoral research (1982-2013) resulted in 201 theses, with 22.4% of them being published as original articles in medical journals. Only 13.3% were published in PubMed-indexed journals. The production and publication of theses are on the rise. Hence, a continuous assessment and planning of research of theses are recommended.

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