

Pediatric Medical Research: Where is the Gap?

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Objective: To evaluate the trends in pediatric researches performed at the main hospital in Bahrain and to identify existing research gaps.

Setting: Pediatric Department, Salmaniya Medical Complex, Bahrain.

Design: A Retrospective Study.

Method: All scientific contributions produced by the pediatric department were identified between 1 January 1977 and 31 May 2018. Annual and cumulative trends of scientific production were calculated. Articles were stratified based on publication type, medical subspecialties and types of publishing journals. Pediatrician's gender, job description and current job were documented.

Result: Out of 416 scientific contributions, 309 scientific publications were analyzed (293 journal articles, 5 books, 9 book chapters, 2 booklets). There was a significant increase in the number of publications over the last four decades (P -value <0.0001). Hematology and gastroenterology were the most researched specialties, 38 (12.3%) publications each. Publications on infectious diseases were eight (2.6%) and seven (2.3%) on oncology. Out of 257 (83.2%) publications, 125 (40.5%) articles were published in international journals. Forty-seven (51.1%) out of 92 pediatricians had scientific publications. Of the 47 pediatricians, 36 (76.6%) were consultants and 11 (23.4%) were residents (P -value <0.0001). Gender (P -value=0.838) and position (P -value=0.633) had no effects on publication.

Conclusion: In the last four decades, there has been a remarkable increase in the number of pediatric publications at the main hospital in Bahrain, with special emphasis on hematological and gastrointestinal problems. Yet, there is a continuous need to study important health problems, such as cancer and infections.

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Medicine is an evolving science¹. All scientists aim to discover and disseminate truth via generating and testing hypotheses². In the era of evidence-based medicine (EBM), physicians are required to deliver the best management to their patient^{1,3}. Research is one of the pillars for patient management^{1,4}. The importance of research in pediatric age groups is well recognized^{5,6}. Improvement of child health outcomes can be strengthened by properly conducted research^{7,8}. It is common that clinical decisions about pediatric care rely on adults research⁵. However, because of the physiological differences between children and adults, it is not sufficient to rely on results obtained from adult studies and generalize them to children^{5,6}.

Research articles remain the most influential method of spreading new knowledge and establishing academic hierarchies at both individual and institutional levels⁹. Attaining

better understanding of diseases, higher social or hospital standing, and research grants or awards acquisition are the main benefits of conducting clinical research¹⁰. Furthermore, the academic standard makes publication obligatory for an academic promotion^{1,11}. Research and journal publications are also necessary for academic institutions¹¹.

Salmaniya Medical Complex (SMC) was established in 1970 and remains the main hospital that provides secondary and tertiary healthcare to all the citizens and residents of Bahrain at the high-quality level¹². Recently, in November 2016, a pediatric research committee has been established. Data management, statistics and epidemiology, and study implementation are the three main basic requirements necessary to support any clinical research division¹³.

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The aim of this study is to evaluate trends in pediatric research in Bahrain and to identify existing research gaps.

METHOD

All scientific contributions produced by the pediatric department at SMC between 1 January 1977 and 31 May 2018 were identified through electronic databases and by direct contact with all pediatric physicians for journal hard copies. Shared works with other medical staff, such as rotating physicians and trainees including family physicians, nurses, interns, and clinical attachment have been included. Duplicate publications were excluded. The following were included: journal articles, book chapters, books and booklets. The journal articles were stratified into original articles, case series, case reports with literature review, case reports, review articles, theses, audits and guidelines. Publication years were identified. The annual incidence of scientific production and the overall cumulative prevalence were calculated. In order to study the trend of scientific publications, the results were categorized into ten-year-year periods.

Each scientific contribution was classified based on medical subspecialties. Journals which published the articles were classified into local (journals published in Bahrain), regional (journals published from Arabian Gulf countries) and international. Impact factors for published journal were retrieved using Google search engine. Details about the current job position and research activities for each pediatrician were also recorded and compared.

SPSS version 21 was used. Data were expressed as frequency and percentage or median and range. Kruskal Wallis test was used to compare publication numbers in the four decades and to compare the impact factors of local, regional and international journals. Fisher's exact and Pearson chi-square tests were used to compare publication with gender and job descriptions respectively. Two-sided P-value less than 0.05 was considered statistically significant.

RESULTS

Four hundred sixteen scientific documents were identified. One hundred seven articles were excluded; 86 were unpublished work, 12 were duplicate publications and nine articles were rejected because they could not be retrieved. The remaining 309 publications were analyzed, see figure 1. All the articles were published using English language. The overall median of publications was six publications per year (range from 0 to 17). Two hundred ninety-three (94.8%) were journal articles 201 (65.1%) original article, 47 (15.2%) case reports, 18 (5.8%) case report with literature review, four (1.3%) review articles, three (0.97%) thesis, one (0.32%) audit and one (0.32%) guideline); nine (2.9%) book chapters, five (1.6%) books and two (0.7%) booklets. The publication year was recognized in 268 (86.7%) publications. The number of publications were as follows: 13 (4.2%) in 1977-1986, 34 (11%) in 1987-1996, 89 (28.8%) in 1997-2006 and 132 (49.2%) in 2007-2018. There was a significant increase in the number of publications over the last four decades (P<0.0001), see figures 2 and 3. The publication year was not recognized in the remaining 41 (13.3%) (20 presented at local conferences, 10 presented at international conferences, 6 posters, 4 diploma projects and 1 thesis).

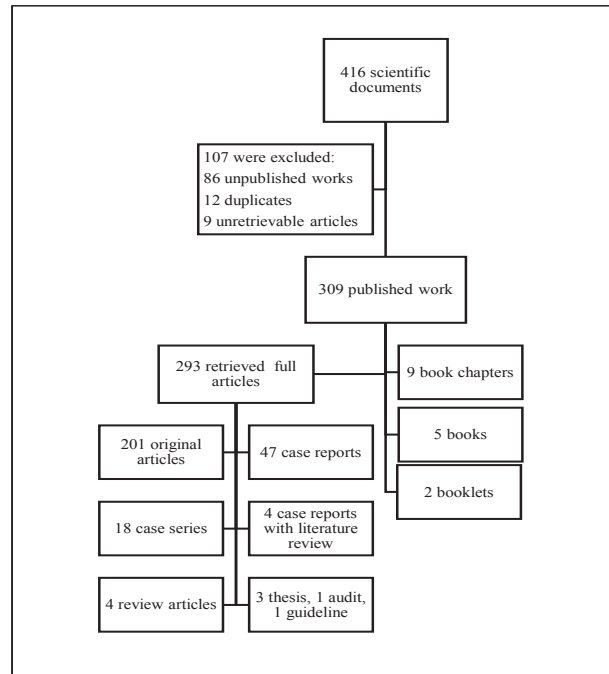


Figure 1: Scientific Publications of the Pediatric Department, SMC (January 1977 - May 2018)

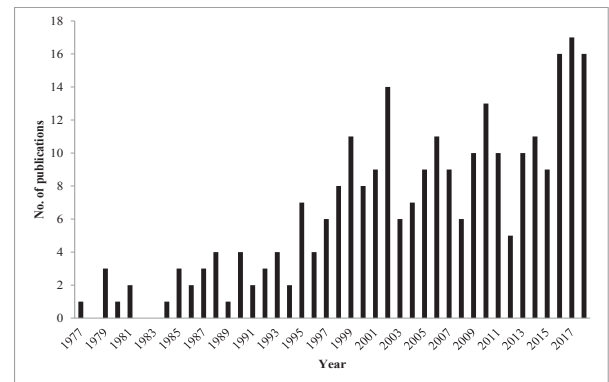


Figure 2: Number of Scientific Publications per Year from the Pediatric Department at SMC (January 1977 - May 2018)

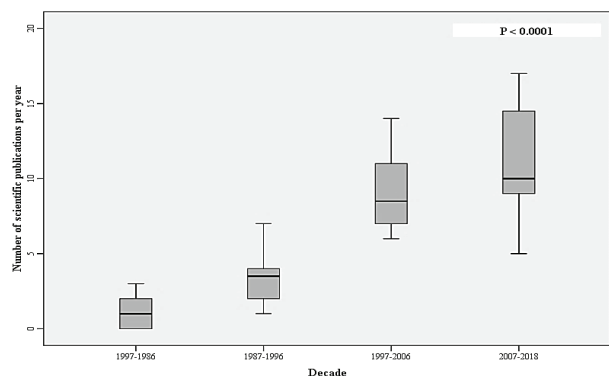


Figure 3: Scientific Publications Per Decade at the Pediatric Department, SMC (January 1977 - May 2018)

The publications covered different pediatric specialties. Hematology and gastroenterology were the most researched areas with a total of 38 (12.3%) publications for each, see figure 4. Infection was represented only by eight (2.6%) publication

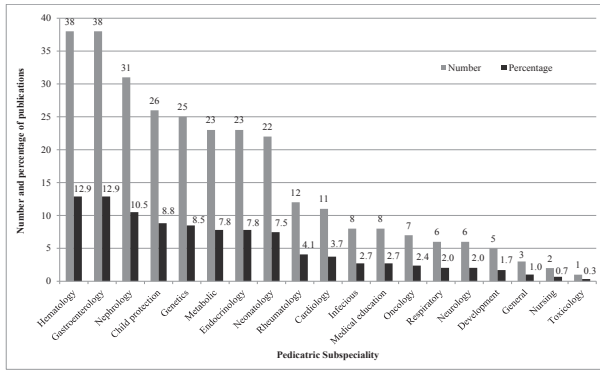


Figure 4: Number of Publications Per Subspecialty from the Pediatric Department

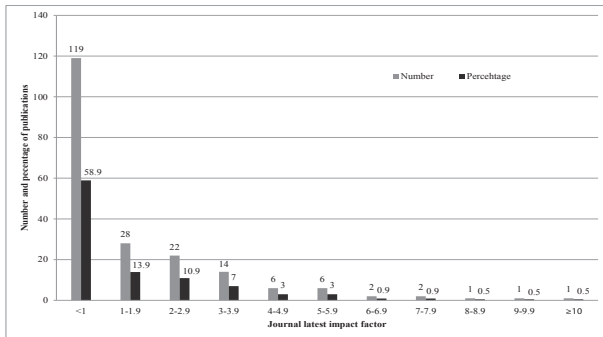


Figure 5: Number of Publications Per Journal Recent Impact Factor from the Pediatric Department

Table 1: Relationship Between Scientific Productivity and Gender, Job Description and Current Position of 92 Pediatricians at SMC (January 1977 - May 2018)

Variable	Published n (%)	Not published n (%)	Total n (%)	P-value
Gender				
Male	23 (52.3%)	21 (47.7%)	44 (47.8%)	0.838*
Female	24 (50%)	24 (50%)	48 (52.2%)	
Total	47 (51%)	45 (49%)	92 (100%)	
Job description				
Consultant	36 (80%)	9.0 (20%)	45 (48.9%)	<math><0.0001†</math>
Chief resident	8.0 (32%)	17 (68%)	25 (27.2%)	
Senior resident	3.0 (20%)	12 (80%)	15 (16.3%)	
Junior resident	0.0 (0.0)	7.0 (100%)	7.0 (7.6%)	
Total	47 (51%)	45 (49%)	92 (100%)	
Position				
In service	34 (49.3%)	35 (46.7%)	69 (75%)	0.633*
Out service	13 (56.5%)	10 (43.5%)	23 (25%)	
Retired	12 (60%)	8.0 (40%)	20 (21.7%)	
Resigned	1.0 (33.3%)	2.0 (66.7%)	3.0 (3.3%)	
Total	47 (51%)	45 (49%)	92 (100%)	

*Fisher's exact test, †Pearson chi-square.

and cancer was seven (2.3%). On stratifying the scientific involvements according to the type of publishing journal, 125 (40.5%) articles were published internationally, 90 (29%) in local and 42 (13.4%) in regional journals. Two hundred two (65.4%) were published in journals with an impact factor, see figure 5. The median impact factor of the publishing journals was 0.71 (range 0.03 to 10.3). International journals had higher impact factors (median 2.4, range 0.2 to 10.3) compared to regional (median 0.7, range 0.06 to 1.2) and local (median 0.15, range 0.03 to 0.66) journals ($P<0.0001$).

Ninety-two pediatricians were identified in the study, 47 (51.1%) of them had scientific publications, see table 1. Thirty-six (76.6%) consultant physicians had published articles which were significantly higher than chief, senior and junior residents ($P<0.0001$). Gender ($P=0.838$) and position ($P=0.633$) had no effects on publication.

DISCUSSION

This study revealed a remarkable increase in the number of pediatric publications over the last four decades. Medical research and disease-specific data in Arab countries are limited¹⁴. This study found 51% of the pediatricians had published scientific papers. Sumi et al found that more than two-thirds reported a current (68%) and past (74%) research involvement¹⁰. In India, the number of research articles published in the medical field is still limited, only 4% of the residents had publications, 50% had participated in research and only 28% had made scientific presentations³.

In this study, 68.8% were original articles followed by case reports (15.9%). Hamadah et al found that the most common publication in the Arab world were case reports (34.8%)⁸. The types of pediatric research differ according to the setting's level of income⁶. In high-income settings, pediatric research studies are likely to be smaller, early phase studies, in non-communicable diseases and performed in well-equipped hospitals; they tend to be larger and more disease-management-type in low-income settings⁶. Research involvements deserve more attention⁷. Hamadah et al found that low-middle-income countries were more likely to publish descriptive researches compared to high-income countries that produced more analytical and experimental researches⁸. In Arab countries, health ministries should encourage and support analytical and experimental research⁸.

The present study revealed that hematological and gastrointestinal subspecialties were the main subspecialties which have produced research papers. On the other hand, we still lack research in infectious disease (2.7%) and oncology (2.4%). There is paucity in cancer research publications in several developing countries including Bahrain despite the fact that cancer poses a worldwide healthcare burden⁸. Cancer research is crucial for the development of effective, precise and sustainable healthcare policies¹⁵.

In the present study, 40.5% of the articles were published in international journals, 29% in local and 13.4% in regional journals. In addition, our study showed that the impact factors of the involved journals were higher in international journals compared to the regional and local journals. Hamadah et

al found that 90.9% of researches from Arab countries were published in international journals while publications in local and regional journals account only for 4.6% each⁸. This might be explained by the fact that articles published in local and regional journals are unlikely to be indexed in the commonly used online databases, especially those written in Arabic⁸. Moreover, some academic institutions consider only publications from indexed and abstracted biomedical journals or from internationally recognized media such as Medline, PubMed, ISI Web, etc¹¹. However, top quality manuscripts of some inexperienced authors are published in non-indexed journals¹¹.

In the current study, 76.6% of pediatricians who published scientific papers were consultants and faculties at universities and only 23.4% were residents. This could be due to the lack of research training within the pediatric residency program at SMC. Sumi et al found that faculties (89.1%) were more likely to have past participation in clinical research compared to residents (53.5%)¹⁰. Programs that involve high-school, college, and medical students into pediatric research led to a long-term interest in research⁷. However, there is still a shortage of young pediatricians whose aim is to carry out fundable research⁷.

Although this study did not show any gender difference in publication, there are several evolving trends in pediatric research related to gender¹⁶. Spector et al found that fewer women enter research compared to men¹⁶. Therefore, as the proportion of females increases in pediatric departments, the number of pediatric researchers might decrease¹⁶. The overall underrepresentation of females as main editors and on the editorial boards may partially explain the gender gap in authorship¹⁷.

Our study showed that 48.9% of pediatricians did not publish any scientific papers. Many ethical and practical problems have led to a paucity of high quality pediatric research⁵. The evolution of children's medical care depends on their inclusion in clinical trials¹⁸. However, children's involvement in research and exposure to risk might be difficult to be ethically justified especially that they could not give their own informed consent^{15,19}. Over the years, ethical guidelines started to be embodied in regulations²⁰. In developing countries, pediatric research regulations are often rigid, confusing or even non-existent⁶.

Another important barrier for conducting pediatric research is a parental concern. The capability to effectively communicate with parents about research depends on our understanding of their concerns and fears²¹. Furthermore, participation in research and publication requires a lot of time^{11,21}. Sumi et al found that lack of time was the main reason why the clinical doctors were unable to conduct research¹⁰. Many clinicians can only conduct the study and make an outline of a paper ready, but they cannot write the manuscripts¹. A study by Pawar et al revealed that the major obstacles to pursuing research during residency are lack of time due to clinical work (74%), lack of research curriculum (42%), inadequate facilities and financial support (38%) and insufficient guidance by teaching staff (24%)³.

All physicians should recognize the science and art of research methodology¹. Research methodology should be a requirement

for a resident. Time for research activities should be allocated in the curriculum as requested by most residents (86%)³.

Academic institutions, faculty and fellowship programs must be armed with well-trained research fellows using collaborative and interdisciplinary approaches²². A clinical research support center should be established to provide initial advice regarding research design¹⁰. Financial assistance is also needed for the research itself and for the publishing process¹¹.

The study was limited by missing details related to the type and year of some publications. Another limitation is that most of the research producers were from a consultant level which does not reflect the entire pediatric staff.

CONCLUSION

The last four decades have witnessed a remarkable increase in the number of pediatric research publications in the main hospital in Bahrain, with special emphasis on hematological and gastrointestinal problems among the pediatric age group. Pediatricians in Bahrain needs more support and training on the how to conduct clinical research.

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Competing Interest: None.

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