

# Perception, barriers, and practice of research among teaching staff at five Sudanese medical faculties

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**Introduction:** Research is one of the best measures of scientific progress at both individual and institutional levels. The objective of this study was to assess perception, barriers, and practice of research among teaching staff at five Sudanese medical faculties.

**Methods:** This was a cross-sectional study included 153 faculty members in three public and two private medical faculties. Self-administered questionnaires were distributed to them. Data obtained had been analyzed using statistical package for social studies (SPSS) version 24.

**Results:** One hundred (65.4%) of respondents were males, and the mean age of them was 41.25 ( $\pm 9.92$ ) years, almost half of them were assistant professors (49%) and 90 (59%) of them work for public medical schools. Staff at medical faculties conducted more cross-sectional studies (30.6% of total research output), while literature review was the least type of research output (7.9%). Importantly, more research publication was associated with male participation ( $P=0.039$ ) and research training ( $P=0.016$ ). The perception of Sudanese doctors for research was strongly favorable (98.6%). Factors that significantly influence this positive perception for research were male gender ( $P=0.043$ ), working for universities in Khartoum state ( $P=0.042$ ), receiving undergraduate research education ( $P=0.010$ ), research training after graduation ( $P=0.016$ ) and years of research experience ( $P=0.042$ ). The most important research barriers were lack of funding (79.6%), lack of financial incentives (66.4%), and work-related stress (57.2%).

**Conclusions:** Despite the high perceptions of Sudanese doctors for research, funding remained the most important barrier to research.

**Keywords:** Research; Sudan; universities

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## Introduction

Research is an extremely important element in the improvement and advancement of health care services provided to the public (1). The development of research activities is crucial at both individual and institutional

levels. It is also vital for the development of both clinical practice and academic work (2). Nowadays, one of the best measures of scientific progress in a country is the research situation in their scientific and academic communities (3). The balance among teaching, research, and service, however, differs widely across institution types and by terms

of the faculty member's appointment (4). Bess *et al.* (2000) explained that due to the complexity of college teaching, various roles could not be expected to be filled by only one person (5). The authors identified seven teacher sub roles—content research, instructional design, instructional delivery, discussion leading, content/activity integration, assessment, and mentoring—and argued that collaborating teams could provide more comprehensive service to students than can individual teachers (5). In universities, publication of high quality will lead to promotion within the university ranking system, this beside the national and international recognition (6). Institutional service performed by faculty members includes serving on internal committees and advisory boards, mentoring and advising students, and assuming part-time administrative appointments as program or unit leaders. Unfortunately, this kind of activities is not as highly regarded as research and teaching concerning advancement within faculty ranks (4). Despite the importance of research, negative perceptions and attitudes toward research may result in poor performance in research (7). While a positive attitude may result in better research performance. For instance, in Japan, most physicians (97%) believed that it is necessary for physicians to conduct clinical research. While, in Pakistani medical universities, a large majority (85.2%) of study participants agreed that research was helpful for universities, research was helpful in promoting critical thinking and improvement of patient care (8). Importantly, some studies proved an association between gender and research perception. For example, Funston *et al.* found that significantly fewer females expressed an interest in research participation as a medical student or future research career (9). The American Medical School Graduation Questionnaire (1990–2002) similarly identified that fewer female students intended to pursue “extensive” involvement in research (10).

Several factors can influence the participation of doctors in medical and clinical research. Lack of time is regarded as the main factor, lack of financial support and incentive, lack of research training, family commitment and bringing up children and research not being part of their career plan (8–11). These factors seem to influence doctors in low resource setting countries as well as rich and advanced countries. Many studies worldwide investigated perception, barriers, and practice of medical research among different groups of medical professionals (1,12–16). As there is limited data about perception, practice, and barriers of research among teaching staff at Sudanese medical faculties, the main objective of this paper is to explore these issues.

## Methods

### Study design

This is an analytical cross-sectional study was carried out among the teaching staff of Sudanese medical faculties. This study was carried out during the period from July 2016 to July 2017. All members of teaching staff at five medical faculties including teaching assistants, lecturers, assistant professors, associate professors, and full professors.

### Study area

This study was conducted in five medical faculties; three of them were governmental (Bahri, Gadarif, and Kordofan Universities) and the other two are private (The National Ribat University and Sudan International University). Two out of these chosen five medical schools are established outside the capital (Gadarif and Kordofan Universities).

### Sampling

It was stratified random sampling by dividing the population into two strata; each one is homogeneous: public (governmental) medical faculties and private medical faculties. Samples from each stratum were taken proportionately to the size of the stratum so that the overall sample matches the population. Since there were 30 public medical faculties and 26 private medical faculties, the sample made from three medical faculties of the first stratum and two from the second (after excluding six private medical faculties just established this year). The five medical faculties were Bahri, Gadarif and Kordofan Universities (from the first stratum), and the National Ribat University and Sudan International University (from the second). Gadarif and Kordofan Universities are established outside the capital.

The sample size was calculated and lists of teaching staff obtained from the authorities made the sample frame.

### Sample size

The following equation calculated the sample size:

$$N = \frac{N}{1 + N(d)^2} \quad [1]$$

Where:

n: is the sample size.

N: is the population size.

d: is the degree of accuracy desired (0.05)

The total number of teaching staff in the five medical

school previously mentioned is about 390.

$$n = \frac{390}{1 + 390(0.05)^2} = 197.5 \quad [2]$$

Then because the population size is small, the adjusted sample was used according to the following equation:

$$n = \frac{n_0}{1 + (n_0 - 1) / N} = \frac{197.5}{1 + (197.5 - 1) / 390} = 131.7 \quad [3]$$

According to the equation, the sample size for this study is 132. It is increased to 180 to compensate for non-respondents and inadequately filled questionnaires.

### Study variables

#### Dependent variables

Twenty-three questions included in the questionnaire to assess perception, barriers, and practice of medical research.

#### Independent variables

Independent variables were: socio-demographic characteristics, (e.g., age, gender, marital status), qualification, university, years of experience, the current position at the university, medical specialty, and years since graduation.

### Data collection

Data were collected using a self-administered questionnaire consisted of four parts:

- ❖ Part one: socio-demographic data: mentioned above;
- ❖ Part two: research practice: direct questions about current involvement in research, whether received research training, whether participated in research apart from necessary research for MBBS, MSc, MD or PhD. Other questions about types of research, number of publications, oral and poster presentations, and whether published as first or co-author;
- ❖ Part three: research difficulties and barriers: these were collected from previous studies to make a simple list of 13 barriers and the participant was asked to pick one or more of them;
- ❖ Part four: perception of research: this was assessed using Likert response scale from 1 to 5 (1= strongly disagree; 2= disagree; 3= neutral; 4= agree; 5= strongly agree). The perception section included 14 statements representing many aspects concerning medical research. This part was a predesigned validated structured questionnaire used to assess

research perception in previous studies with some modification (17). This scale was not used to divide participants' perception into positive and negative, but to compare between subgroups regarding that the higher scores represent, the more favorable perception.

### Data analysis

The collected data were analyzed using version 24 of the IBM statistical package for social science (SPSS) program. A chi-square test was carried out on the relationships between demographic and other variables. ANOVA was used to compare means of perception scores among different subgroups. A P value less than 0.05 was considered significant.

### Ethical consideration

The research ethics committee ethically approved the research at The National Ribat University. Permission was obtained from the authorities of the medical faculties. Informed consent was attached with the questionnaire, including the purpose of the study, voluntary participation, and confidentiality.

### Study limitations

The study was done in only five medical faculties which was not randomly selected due to problems of accessibility. It is recommended that a more comprehensive study with more facilities and budgets, to be conducted to ensure the high level of generalizability.

## Results

### Socio-demographic characteristics

A total of 153 respondents, submitted adequately filled questionnaires, were included in the study. The response rate was 85%. Sixty-five percent of respondents were males, and the mean age of them was 41.25 (SD ±9.92) years. Furthermore, 90 (59%) were from public universities, and 63 (41%) were from private ones. The majority have the MD (36.8%), and MSc (30.9%) as qualification and almost half of them are assistant professors (49%).

### Type of research and research output

The most common research conducted in Sudanese medical

**Table 1** Association between research publications and previous research experience and training

Variables	Research publication		Total, n (%)	P value
	Yes, n (%)	No, n (%)		
Strata				0.710
Public	38 (42.7)	51 (57.3)	89 [100]	
Private	25 (39.7)	38 (60.3)	63 [100]	
Sex				0.039*
Male	47 (47.5)	52 (52.5)	99 [100]	
Female	16 (30.2)	37 (69.8)	53 [100]	
Received research training after graduation				0.016*
Yes	57 (46.3)	66 (53.7)	123 [100]	
No	6 (21.4)	22 (78.6)	28 [100]	
Received adequate undergraduate education in research				0.691
Disagree	25 (37.9)	41 (62.1)	66 [100]	
Neutral	14 (42.4)	19 (57.6)	33 [100]	
Agree	22 (45.8)	26 (54.2)	48 [100]	

colleges was cross-sectional studies with research output of 30.6% and around 41.4% of staff involved in such type of studies. Importantly, the least type of research conducted was a literature review (7.9%). The research output in areas like clinical trial, basic science, prospective studies, retrospective studies and case report were 12.8%, 15.2%, 11.7%, 10.8% and 11.1% respectively.

### Research, gender, and previous research training

Table 1 shows that more research publications are associated significantly with male participants and those who received research training after graduation.

### Perception of research

Table 2 shows the degree of agreement with every single statement of the research perception scale. The percentage of each response is also indicated. Generally, most of the respondents agreed with the statements.

### Research barriers

Most of the respondents indicated “lack of funding” (79.6%) and “lack of financial incentives” (66.4%) as the most important research barriers facing faculty members at Sudanese medical faculties. This was followed by “work-related stress” as a barrier (57.2%) and lack of allocated time for research (38.8%). Other research barriers like lack of

statistical support, supervisors, research skills and research motivations ranged between 20% to 30%. Table 3 showed more favorable perception is associated with male sex, working for a university in Khartoum state, adequate undergraduate education in research, research training after graduation, and those who have experience as a faculty member for 9–19 years. The mean of perception seems to be increasing with higher academic position, i.e., the best is seen among professors while the least is seen among teaching assistants. But this finding is not statistically significant ( $P=0.426$ ).

### Discussion

This study showed that perception of Sudanese doctors for research was strongly favorable (98.6%). This finding is similar to many studies in which a large majority of participants agreed with the importance and necessity of research in the medical field (8,17). Furthermore, 94.6% of participants in this study agreed that teaching research methodology should be part of the curriculum. All participants (100%) disagreed with the statement: “Undertaken research increases the burden in already over-curriculum (heavy load—educational or clinical) medical student.” These may be expected findings because they all are teaching staff at medical faculties who are supposed to believe in the importance of research. But on the other

**Table 2** The response of universities staff to statements about research perception

Statement	Mean	SD	Response		
			Agree, N (%)	Neutral, N (%)	Disagree, N (%)
Role of research in the medical field is important	4.84	0.48	145 (98.6)	1 (0.7)	1 (0.7)
Conducting research during medical school is important	4.41	0.77	132 (89.8)	13 (8.8)	2 (1.4)
Research participating should be made compulsory to all medical students	4.27	0.76	124 (84.4)	22 (15)	1 (0.7)
Teaching research methodology should be part of the curriculum	4.67	0.68	139 (94.6)	6 (4.0)	2 (1.4)
Research conduction during medical school has a positive impact on medical students	4.35	0.79	130 (88.4)	14 (9.5)	3 (2.0)
Research record should be an important criterion for recruitment and promotion of teaching staff	4.29	0.86	121 (82.3)	21 (14.3)	5 (3.4)
Research conduction reinforces teamwork spirit	4.25	0.84	126 (85.7)	16 (10.9)	5 (3.4)
Research is a part of my long-term career goals	4.30	0.80	125 (85.0)	19 (12.9)	3 (2.0)
I think that I have a good understanding of research methodology	3.82	0.93	99 (67.3)	34 (23.1)	14 (9.5)
Patient outcome improves with continued medical research	4.42	0.76	128 (87.1)	18 (12.2)	1 (0.7)
Undertaken research increases the burden in already over-curriculum (heavy load—educational or clinical) medical student	1.51	0.50	0	0	152 (100.0)
A medical student can plan and conduct good and publishable research projects	3.90	0.84	104 (70.7)	36 (24.5)	7 (4.8)
I am interested in doing research	4.44	0.80	128 (87.1)	14 (9.5)	5 (3.4)
Being a medical teacher is encouraging me to participate in research activities	4.34	0.77	130 (88.4)	15 (10.2)	2 (1.4)

The overall mean of research perception is 4.13 (SD  $\pm$ 0.47).

side, there are some responses indicate less favorable perception; for example, only 82.3% of participants believe that research record should be an important criterion for recruitment and promotion of teaching staff. Only 70.7% agreed that medical student could plan and conduct good and publishable research projects. Only 67.3% think that they have a good understanding of research methodology. This lack of understanding of research methodology may affect the attitude and practice of research. A similar finding was reported by the study of by Alghanim & Alhamali in 2011 in Saudi Arabia, 24.4% of participants who did not publish research articles, reported lack of knowledge in research methodology (18). This finding requires attention not only because it will decrease research productivity by a faculty member, but because it may affect his students' perception and practice of research indirectly.

Factors that significantly influence this positive perception for research were male gender ( $P=0.043$ ), working for universities in Khartoum state ( $P=0.042$ ), receiving undergraduate research education ( $P=0.010$ ), research training after graduation ( $P=0.016$ ) and years of research experience ( $P=0.042$ ). The most important research barriers were lack of funding (79.6%), lack of financial incentives (66.4%), and work-related stress (57.2%). The decline in participation of female in academic medicine is also reported in UK and USA (9,10). However, other studies showed that the differences among gender were not statistically significant (19,20). Furthermore, this study showed that more research publication was associated with male participation ( $P=0.039$ ) and research training ( $P=0.016$ ). No clear reason was identified in the current study to explain this difference, but they may be due to

**Table 3** Factors that influence research perception

Variables	Mean (SD)	P value
Sex		0.043*
Male	4.19 (0.40)	
Female	4.03 (0.57)	
Strata		0.352
Public	4.10 (0.53)	
Private	4.17 (0.38)	
University		0.042*
In Khartoum state	4.20 (0.37)	
In other states	4.04 (0.57)	
Who think they have received adequate undergraduate education in research		0.010*
Disagree	4.13 (0.53)	
Neutral	3.95 (0.46)	
Agree	4.27 (0.33)	
Received training in research after graduation		0.016*
Yes	4.18 (0.48)	
No	3.94 (0.39)	
University graduated from		0.491
In Sudan	4.12 (0.47)	
Outside Sudan	4.21 (0.43)	
Medical specialty		0.264
Clinical	4.09 (0.55)	
Subclinical	4.18 (0.34)	
Years of experience		0.042*
1–8	4.06 (0.54)	
9–19	4.28 (0.36)	
20–36	4.01 (0.35)	
Age		0.316
25–34	4.06 (0.45)	
35–44	4.06 (0.60)	
45–54	4.27 (0.36)	
55–57	4.13 (0.37)	
Current position		0.426
TA	3.88 (0.58)	
Lecturer	4.09 (0.38)	
Assistant Prof.	4.14 (0.53)	
Associate Prof.	4.24 (0.40)	
Professor	4.27 (0.15)	

SD, standard deviation.

different cultural and social expectations and responsibilities faced by females compared to males. This study also found that more favorable perception is associated with teaching staff working for universities in Khartoum state (0.042). This may be justified by the fact that in Khartoum, the capital, there are many opportunities for research activities and training, more facilities, and maybe more scientific research environment comparing with medical faculties located in other states.

There were other two factors indicated by this study to be associated with more favorable perception; receiving adequate undergraduate education in research and receiving research training after graduation. Both of them were indicated by other previous studies to have a relationship with good perception and production of research (14,17,21). It is possible to suggest most people are well trained in conducting cross-sectional epidemiological studies, and this may reflect in high research output (30.6% of total research output), while literature review was least type of research output (7.9%). The current study did not prove a statistically significant association between research perception of teaching staff and the universities they graduated from or their medical specialties. Importantly, most of the respondents indicated “lack of funding” (79.6%) and “lack of financial incentives” (66.4%) as the most important research barriers facing faculty members at Sudanese medical faculties. This finding may be expected in a developing country with relatively low budgets allocated for scientific research and low salaries. However, this is even seen in developed countries. For example, in the USA, 84% of those who did not report current participation in research indicated financial reasons as the main barrier (22). In Saudi Arabia, 66.9% of faculty members indicated a lack of financial incentives as one of the research barriers (18). Financial incentives and infrastructural support are key factors in the promotion of research (23).

The third barrier mentioned in the current study was “work-related stress” indicated by (57.2%) of respondents. It is similar to some extent to what indicated by 52.3% of Saudi faculty members that “overloaded teaching schedule” was a research barrier (19). In Sudan, this barrier is related to the observation that many faculty members are overloaded by clinical work and sometimes their private clinical or teaching activities which they involve in to meet their financial needs. These activities usually occupy their leisure time and may limit their research activities. The fourth barrier in this study was the lack of time allocated for research (38.8%). This barrier may also be related to the previous one. Lack of

time allocated for research was also indicated as a barrier in many other studies with the different degree of importance. For example, it was reported by 66.5% of junior faculty of Pakistani medical universities (17) by 70.7% of Saudi faculty members at medical and health schools (18). Doctors working in primary care in West Midland in UK reported that 41% not interested in research and commonly perceived barriers to undertaking research were lack of time (92%), lack of staff to collect data (73%) and a lack of funding (71%) (11). Generally, in this study, most of the barriers indicated by participants can be considered “institutional”; lack of fund, financial incentives, work-related stress, rather than individual; e.g., lack of motivation or perceived difficulty of research. This suggests that institutional efforts are important to promote research. Some measures tend to increase the involvement in medical research. These measures include accessible resources, appropriate rewards/incentives, time allocation, and promotion at work (24-32).

## Conclusions

The study demonstrated that research perception of teaching at Sudanese medical faculties were favorable; 98.6% of them agreed with the important role of research in the medical field, and most of them agreed with involving medical students in research activities. Even though the majority of medical doctors are interested in research, lack of funding represents a major barrier for achieving such goal. The short-term solution may be by applying for international research grants or participation in clinical trials funded by pharmaceuticals companies. Sudan is a large country with populations from different ethnic backgrounds. Therefore, the establishment of proper research industry in Sudan may reveal exciting information about human genomes that may in part help in formulating new remedies for different diseases.

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