ORIGINAL ARTICLE

تصورات طلاب الطب الباطني عن بيئة التعلم في الدراسات العليا في السودان

الخلفية: تم إثبات أن بيئات التعلم المثلى مرتبطة بنتائج التدريب الإيجابية للطلاب. يعد برنامج الإقامة في تخصص الطب الباطني أحد أقدم برامج الإقامة في السودان. ومع ذلك ، هناك القليل من البيانات المتعلقة بكيفية إدراك الطلاب عن بيئات التعلم في المستشفيات التدريبية. لذلك ، كان الغرض من هذه الدراسة هو تقييم تصورات الطلاب عنها.

الطريقة: أجريت هذه الدراسة المقطعية المستندة إلى المستشفيات بين نوفمبر ٢٠١٧ وأبريل ٢٠١٨ ، باستخدام استبيان للقياس التعليمي لمستشفى الدراسات العليا (PHEEM= Postgraduate Hospital Educational Measurement) لقياس تصورات الطلاب حول بيئة التعلم. تم توزيع الاستبيانات على ٢٠٠ منهم. تم إجراء التحليل الإحصائي باستخدام SPSS 25 ، و اختبار T للطالب ، و ANOVA .

النتائج: في المجموع ، اعاد ١٨١ من الطلاب الاستبيانات. من بين هؤلاء ١٠٤ (٥٧/٤٪) من الذكور و ٧٧ (٤٢/٦٪) من الإناث. كانت النتيجة الكليه ل-PHEEM ٧٢/٤±٣١/٥ من ١٦٠ ، مما يدل على مشاكل كبيرة في بيئة التعلم من برنامج الاقامة للطب الباطني. كان هناك ستة بنود تعني درجات أقل من ٢ ، وبالطبع تطلب المزيد من الاهتمام. هذه تتضمن: عقد عمل يوفر معلومات حول ساعات العمل (١/٣±١/٤) ، وجود برنامج تعريفي اخباري (١/٤±١/٤) ، وجود كتيب تدريب غني بالمعلومات (١/٣±١/٢) ، وضع المدربين التوقعات (١/٨±١/٥) ، وجود وقت تعليمي محصن (١/٩±١/٣) و إشراف جيد في جميع الأوقات (١/٩±١/٣).

الخلاصة: تم تحديد مشاكل كبيرة لبيئه التعلم فى المستشفيات التعليمية. يجب إيلاء المزيد من الاهتمام والجهد ، لا سيما للنقاط ذات الضعف في هذه الدراسة ك: وجود برنامج تعريفي اخباري ، كتيب تدريب غني بالعلونات، إعداد مناسب للتوقعات ، وقت تعليمي مثالي في الوحدة و توفر إشراف جيد في جميع الأوقات.

الكلمات المفتاحية: بيئه التعلم، (PHEEM= Postgraduate Hospital Educational Measurement)، البيئة التعليمية، الطلاب(السكان) السودان

Internal Medicine Residents' perceptions of learning environments in postgraduate training in Sudan

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Background: Optimum learning environments (LEs) have been shown to be linked with positive training outcomes for residents. The internal medicine residency programme is one of the oldest residency programmes in Sudan. However, there is little data concerning how the residents perceive the LE in training hospitals. Therefore, the purpose of this study was to assess the residents' perceptions of the LE.

Methods: This cross-sectional, hospital-based study was carried out between November 2017 and April 2018, using a Postgraduate Hospital Educational Environment Measurement (PHEEM) questionnaire to measure the residents' perceptions of the LE. Questionnaires were distributed to 200 residents. Statistical analysis was carried out using SPSS 25, Student's t-test, and ANOVA.

Results: In total, 181 residents returned the questionnaires, of whom 104 (57.4%) were male, and 77 (42.6%) were female. The global mean PHEEM score was 72.4 ± 31.5 out of 160, illustrating significant problems in the LE of the internal medicine residency programme. Six items had mean scores below 2 and, therefore, required more attention. These included: having a contract of employment that provides information about hours of work (1.3 ± 1.4), existence of an informative inductive programme (1.4 ± 1.4), having an informative training manual (1.2 ± 1.3), trainers setting expectations (1.8 ± 1.5), having protected educational time in the unit (1.9 ± 1.3), and having good supervision at all times (1.9 ± 1.3).

Conclusion: Significant challenges in the LE of the teaching hospitals were identified. More attention and effort should be given, especially to the poorly rated points in this study; existence of an informative inductive programme, informative training manual, proper setting expectations, optimum educational time in the unit, and having good supervision at all times.

Keywords: PHEEM; Learning Environment; Educational Environment; Residents Sudan; SMSB

سوڈان میں انٹرنل میڈیسن کے ریزیڈنٹ طلباء کی نظرمیں پوسٹ گریجویٹ لیول میں تعلیمی ماحول

بیک گراونڈ: تعلیمی ماحول کو میڈیکل ریزیڈنٹ کے لئے مفید پایا گیا ہے۔ انٹرنل میڈیسن ریسی ڈنسی پروگرام سوڈان میں قدیمی ریسی ڈینسی پروگراموں میں شامل ہے۔البتہ اس پروگرام سے متعلق کوئي ڈیٹا نہیں ہے کہ پوسٹ گریجویٹ کے میڈیکل اسٹوڈنٹس تعلیمی ماحول کے بارے میں کیا نظر رکھتے ہیں ۔ اس تحقیق کا ھدف تعلیمی ماحول کے بارے میں ریزیڈنٹ طلبا کی نظر معلوم کرنا ہے۔

روش: یہ تحقیق اسپتال میں انجام دی گئي اور دوہزار سترہ سے اپریل دوہزار اٹھارہ تر جاری رہی۔ اس کے لئے پوسٹ گریجویٹ اسپتال فارمولا استعمال کیا گیا اور اسی کے تحت سوالنامہ تیار کیا گیا۔ یہ سوالنامہ دوسو ریزیڈنٹ ڈاکٹروں کو دیا گیا۔اس میں تعلیمی ماحول کے بارےمیں سوالات کئے گئے تھے ۔

ڈیٹا کا تجزیہ ایس پی ایس ایس ٹونٹی فائي اور ٹی ٹسٹ نیز اینووا سے کیا گیا۔

سفارش: ایک سو اکاسی ریزیڈنٹ نے سوالنامے پر کرکے واپس کئے، ان میں ستاون فیصد یعنی ایک سوچارڈاکٹر مرد تھے اور ستتر خواتین تھیں، عالمی پی ایچ ای ای ایم کا مین اسکور بہتر اعشاریہ چار اور اکتیس اعشاریہ پانچ تھا۔ یہ اسکور ایک سو ساٹھ میں سے نکالا گیا تھا۔ اس سے معلوم ہوتا ہے کہ انٹر نل میڈیسن کےپوسٹ گریجویٹ شعبے میں تعلیمی ماحول کو متعدد مشکلات کا سامنا ہے۔چھے آئٹم کا مین اسکور دو سے نیچے تھا جس کے پیش نظر مزید توجہ کی ضرورت ہے۔ اس صورتحال کو سدھارنے کے لئے ملازمت کی قرارداد کی ضرورت ہے کہ جس سے کام کے اوقات معلوم ہوں، نیزاس میں دیگر تفصیلات بھی مندرج ہوں۔ اس کےعلاوہ پیشہ ورانہ نگرانی بھی ہونی چاہیے۔

سفارش: سوڈان میں تعلیمی ماحول کو متعدد چیلنجز کا سامنا ہے جن کو دور کرنے کے لئے مزید توجہ اور سرمایہ کاری کی ضرورت ہے۔

کلیدی الفاظ: تعلیمی ماحول ، رزیڈنٹس ، سوڈان ۔

ادراک دستیاران بخش داخلی از محیط آموزشی در دوره های تحصیلات تکمیلی در سودان

زمینه و هدف: مشخص شده است که محیط های بهینه یادگیری، ارتباط مستقیمی با نتایج مثبت آموزش دستیاران پزشکی دارد. برنامه دستیاران بخش داخلی، یکی از قدیمی ترین برنامه های آموزشی دستیاران در سودان است. با این حال، اطلاعات کمی در مورد ادراک دستیاران داخلی از محیط های مطلوب آموزشی در بیمارستانهای آموزشی وجود دارد. بنابراین هدف از این مطالعه ارزیابی ادراک دستیاران داخلی از محیط های آموزشی بود.

روش: این مطالعه مقطعی مبتنی بر بیمارستان، بین نوامبر ۲۰۱۷ و آوریل ۲۰۱۸ با استفاده از پرسشنامه ارزیابی آموزشی دوره های تحصیلات تکمیلی بیمارستانی (PHEEM) برای سنجش ادراک دستیاران از محیط های آموزشی انجام شد. پرسشنامه ها بین ۲۰۰ نفر از دستیاران داخلی توزیع شد. تجزیه و تحلیل آماری با استفاده از نرم افزار SPSS 25 ، آزمون های تی استیودنت و ANOVA انجام شد.

یافته ها: به طور کلی، ۱۸۱ نفر از دستیاران، پرسشنامه ها را بازگرداندند. از این تعداد ، ۱۰۴ نفر (۵۷/۴٪) مرد و ۷۷ نفر (۴۲/۶٪) زن بودند. میانگین نمره جهانی PHEEM ۳۱/۵± ۷۲/۴ از ۱۶۰ بود که نشان دهنده وجود مشکلات قابل توجه در برنامه محیط های آموزشی دستیاران داخلی پزشکی است. شش مورد، میانگین نمرات زیر ۲ داشتند و بنابراین نیازمند توجه بیشتری هستند. این موارد عبارتند از: داشتن یک قرارداد کاری که اطلاعاتی در مورد ساعات کار (۱/۳±۱/۴) ارائه بدهد، وجود یک برنامه استقرایی آموزنده (۱/۴±۱/۴)، داشتن یک کتابچه راهنمای آموزشی (۱/۲±۱/۳)، تعیین انتظارات مربیان (۱/۸±۱/۵)، داشتن جدول زمانبندی آموزشی مصون از تغییر در واحد مربوطه (۱/۹±۱/۳) و نظارت خوب در همه زمان ها (۱/۹±۱/۳).

نتیجه گیری: چالش های قابل توجهی در محیط های یادگیری بیمارستانهای آموزشی شناسایی شد. لازم است که توجه و تلاش بیشتری بخصوص به نقاط ضعف در این مطالعه معطوف گردد. وجود یک برنامه استقرایی آموزنده، کتابچه راهنمای آموزشی آموزنده، تنظیم انتظارات مناسب، زمان بهینه برای آموزش در واحد مربوطه و داشتن نظارت خوب در همه زمان ها ضروری است.

واژه های کلیدی: PHEEM؛ محیط یادگیری؛ فضای آموزشی؛ دستیاران داخلی سودان؛ SMSB

INTRODUCTION

The learning environment (LE) is defined as 'a set of factors that describes a learners' experience within the organization' (1). The LE includes three components: a) the physical component, which involves the working environment, shelter, and food; b) the emotional component, which includes feedback, support, and the extent of harassment; and c) the intellectual component, which encompasses evidence-based practice and learning with patients (2).

Several previous studies have shown that the LE influences residents' learning, the quality of training outcomes, and healthcare delivery (2-4). The importance of the LE has also been increased by various higher authorities, such as the World Federation of Medical Education WFME (5) and the UK Standing Committee on Postgraduate Education, which stated: 'A working environment that is conducive to learning is critically important to successful learning' (6). Researchers have shown that satisfaction with the LE is important to residents' future success (7-10).

Several validated tools measure the LE at different levels and specialties: the Dundee Ready Educational Environment Measure (DREEM) for undergraduate health professional education (11), the Anaesthetic Theatre Educational Environment Measure (ATEEM) (12), the Surgical Theatre Educational Environment Measure (STEEM) (13), etc. Among these tools is the Postgraduate Hospital Educational Measurement (PHEEM), which is a well-recognised instrument measuring the LE at the postgraduate level (1). PHEEM has been used internationally and shows high validity and reliability as a measurement tool (14–17), with reliability values of 0.92 and 0.93 using Cronbach's alpha (2,8,18).

Recognising LE in any programme is crucial for managing that programme and for further improvement of a planned, delivered, learned and assessed curriculum (17,19). Though little research in Sudan has studied residents in training, the extant studies have shown that satisfaction with provided training, including the working environment, was suboptimum (20).

Since its establishment in 1995, the Sudan Medical Specialisation Board (SMSB) has provided residency training for higher level specialists in Sudan. Prior to 1995, such residencies were the responsibility of universities—specifically the Universities of Khartoum, Gezira and Juba (21).

The SMSB offers a four-year clinical MD programme in many specialties, and its residency training programmes in internal medicine have existed for almost 25 years. The residents undertake their higher specialist training in 15 accredited training centres all across the Sudanese states, while the subspecialised fellowships take place in tertiary hospitals and specialised training centres (20,22). Since the establishment of this program, no single study measures the satisfaction of the residents with the provided training.

Therefore, the purpose of this study is to assess the LE at the five teaching hospitals, in which the residents performed their training, as perceived by the internal medicine residents.

METHODS

Study design and subjects

This cross-sectional, hospital-based research was conducted from November 2017 to April 2018 at five teaching hospitals, which function as major centres for internal medicine residency training.

The study was approved by the Technical Ethical Committee of the Federal Ministry of Health (Certificate No 2-12-2016). Each participant received an invitation letter and an information sheet explaining the aims and purposes of the study, and what is expected from their participation stating that any participant had the right to withdraw from the study at any time, and that confidentiality, self-determination, and subject anonymity would be strictly preserved.

Study instrument and procedure

PHEEM, a self-administered, paper-based questionnaire, was used as an assessment tool for the hospital learning environment and was distributed to all residents (n=200) in training grades one through four (i.e., R1 to R4) at the five studied hospitals. Before administration, the background of the study, as well as its importance and potential impacts, were explained to the residents. Resident confidentiality and anonymity were also guaranteed.

The questionnaire consisted of 40 items about the LE, divided into three subscales: perception of role autonomy, perception of teaching, and perception of social support. Responses to each statement were indicated on a five-point Likert scale as follows: 0 for 'strongly disagree', 1 for 'disagree', 2 for 'uncertain', 3 for 'agree' and 4 for 'strongly agree'. The maximum possible score was 4 or 160, for item scores and overall scores, respectively, and the minimum was 0, with higher scores indicating a better LE. The researchers also included some questions about the residents' demographical characteristics and training grades (R).

Four of the 40 items (items 7, 8, 11 and 13) were negative statements and were scored reversely. The data were interpreted based on Roff's criteria [23]. Results of residents' perceptions of role autonomy, perceptions of teaching, perceptions of social support, and collective scores as specified by the tool inventor (23) are shown in Table 1.

Statistical analysis

All analyses were conducted using the Statistical Package for Social Sciences (SPSS), version 21.0 (SPSS Inc., USA). Descriptive statistics were expressed as mean ± standard deviation (SD), and categorical variables were expressed as percentages. Student's t-test was used to compare the item mean and the overall PHEEM scores between genders. Analysis of variance (ANOVA) was also performed to compare the item mean with the overall score among training grades. Statistical significance was inferred as $p \leq 0.05$. A total of 200 residents were included in this study.

RESULTS

181 (90.5%) out of 200 residents returned the questionnaire (Table 2). Of these, 104 (57.4%) were male, while 77 (42.6%) were female. Most of the participants (89 (49.2%)) were 20-30 years old. Approximately half of the

Table 1. Interpretation of the scores of three domains in PHEEM [23]

The subscale and global scale	Score	Interpretation
Perception of Role Autonomy	0-14	Very poor
	15-28	A negative view of one's role
	29-42	A more positive perception of one's job
	43-56	Excellent perception of one's job
Perception of Teaching	0-15	Very poor quality
	16-30	In need of some retraining
	31-45	Moving in right direction
	46-60	Model teaching
Perception of Social Support	0-11	Non-existent
	12-22	Not a pleasant place
	23-33	More positive than negative
	34-44	A good supportive environment
Global (Overall) Score	0-40	Very poor educational environment
	41-80	Significant problems
	81-120	Is more positive than negative but room for improvement
	121-160	Excellent clinical educational environment

Table 2. Characteristics of respondents

General characteristic		Frequency	Percent
Gender	Male	104	57.4%
	Female	77	42.6%
Age	20–30	89	49.2%
	31–40	75	41.4%
	41–50	17	9.4%
	51–60	0	0.0%
	Above 60	0	0.0%
This year in your training program is	1st year	26	14.4%
	2nd year	91	50.3%
	3rd year	15	8.3%
	4th year	49	27.1%

participants (91 (50.3%)) were in the second year (R2) of the training programme.

The residents in this programme perceived their LE with a global mean score of 72.4 ± 31.5 out of 160, indicating significant problems with the programme's LE.

The mean total scores for perceptions of role autonomy, perceptions of teaching, and perceptions about social support were, respectively, 22.1 ± 12.2 (*need some reskilling, retraining*), 28.3 ± 12.6 (*more positive observation of one's role*), and 21.9 ± 9.2 (*not a pleasant environment*) (Table 3).

The mean of the PHEEM items varied between 1.2 ± 1.3 and 2.8 ± 1.0 (Table (4). The highest rated score was item 16—*I have good collaboration with other doctors in my same year*—at 2.8 ± 1.0. The lowest rated score was item 4—*I had an informative induction programme*—at 1.2 ± 1.3.

Only six items had mean scores below 2 in the PHEEM inventory, and these items, which merit more attention, are as follows: *having a contract of employment that provides information about hours of work* (1.3 ± 1.4); *existence of an informative inductive programme* (1.4 ± 1.4); *having an informative training manual* (1.2 ± 1.3), *trainers setting expectations* (1.8 ± 1.5), *having protected educational time in the unit* (1.9 ± 1.3) and *having good supervision at all times* (1.9 ± 1.3).

Table 3. Interpretation of results of PHEEM (General score & subscales) upon ruffs guidelines[23]

PHEEM subscales	Total mean study score	Max score	Interpretation based
Perceptions of teaching	22.1(12.2)	60	Need some reskilling, retraining.
Perceptions of role autonomy	28.3(12.6)	56	A more positive observation of one's role
Perceptions of social support	21.9(9.2)	44	Not a pleasant environment
Total PHEEM Score	72.4(31.5)	160	Significant problems in Learning Environment

Table 4. Mean score of each item of PHEEM Questionnaire

Item	Mean ±SD
Perceptions of role autonomy	
Q 1 I have a contract of employment that provides information about hours of work.	**1.3(1.4)**
Q 4 I had an informative induction program	**1.2(1.3)**
Q 5 I have the appropriate level of responsibility in this post	2.5(1.1)
Q 8 I have to perform inappropriate tasks	2.1(1.2)
Q 9 There is an informative junior doctors/curriculum handbook	**1.4(1.4)**
Q 11 I am bleeped inappropriately	2.1(1.3)
Q 14 There are clear clinical protocols in this post	2.03(1.4)
Q 17 My hours conform to the new deal	2.1(1.3)
Q 18 I have opportunity to provide continuity of care	2.6(1.1)
Q 29 I feel part of a team working here	2.6(1.1)
Q 30 I have opportunities to acquire the appropriate practical procedures for my grade	2.41(1.2)
Q 32 My workload in this job is fine	2.2(1.4)
Q 34 The training in this post makes me feel ready to be a SpR/consultant	2.2(1.3)
Q 40 My clinical teachers promote an atmosphere of mutual respect	2.6(1.1)
Perceptions of teaching	
Q 2 My clinical teachers set clear expectations	**1.8(1.5)**
Q 3 I have protected educational time in this post	**1.9(1.3)**
Q 6 I have good clinical supervision at all times	**1.9(1.3)**
Q 10 My clinical teachers have good communication skills	2.4(1.2)
Q 12 I am able to participate actively in educational events	2.3(1.1)
Q 15 My clinical teachers are enthusiastic	2.3(1.2)
Q 21 There is access to an educational program relevant to my needs	2.1(1.4)
Q 22 I get regular feedback from seniors	2.3(1.4)
Q 23 My clinical teachers are well organized	2.5(1.1)
Q 27 I have enough clinical learning opportunities for my needs	2.2(1.2)
Q 28 My clinical teachers have good teaching skills	2.6(1.1)
Q 31 My clinical teachers are accessible	2.6(1.1)
Q 33 Senior staff utilize learning opportunities effectively	2.5(1.1)
Q 37 My clinical teachers encourage me to be an independent learner	**2.7(1.1)**
Q 39 The clinical teachers provide me with good feedback on my strengths and weaknesses	2.3(1.2)
Perception about social support	
Q 13 There is sex discrimination in this post	2.0(1.4)
Q 16 I have good collaboration with other doctors in my same year	**2.8(1.0)**
Q 19 I have suitability access to careers advice	2.3(1.1)
Q 20 This hospital has good quality accommodation for junior doctors, especially when on call	2.0(1.3)

Table 4. Continued

Item	Mean ±SD
Q 24 I feel physically safe within the hospital environment	2.0(1.4)
Q 25 There is no-blame culture in this post	2.5(1.2)
Q 26 There are adequate catering facilities when I am on call	2.0(1.4)
Q 35 My clinical teac0068ers have good mentoring skills	2.4(1.2)
Q 36 I get a lot of enjoyment out of my present job	2.2(1.3)
Q 38 There are good counseling opportunities for junior doctors who fail to complete their training satisfactorily	2.2(1.3)

PHEEM: Postgraduate Hospital Educational Environment Measurement – for Standard deviation

No significant difference was noted between males and females regarding the three items and the overall mean scores. The mean for perceptions of teaching for females was 20.8 ± 13.1, compared to 21.6 ± 12.1 for males, with p = 0.675. The overall mean for perceptions of role autonomy for females was 27.5 ± 12.6 and 28.1 ± 12.2 for males, with p = 0.732. The overall mean for perceptions of social support for females was 21.4 ± 9.6 and 21.5 ± 8.9 for males, with p = 0.908. Finally, the overall mean score for females was 69.6 ± 32.7, compared to 71.3 ± 30.6 for males, with p = 0.740 (Table 5).

There was also no significant difference in residents' perceptions of their LE according to their training year. All p values were greater than 0.05 (Table 6).

DISCUSSION

This study was the first to examine the LE for internal medicine residents in Sudan. It would provide authentic feedback to the stakeholders in this programme so that the quality and functionality of the training can be improved. The findings revealed significant issues in the LE that must be addressed and corrected for better learning. If these items remain uncorrected, they will adversely influence the training outcomes of the residents, as is evident in the extant literature (16,18,24).

In the present study, the means of the PHEEM items were similar to those found in two studies from Pakistan (16,17) and were lower than those found in other studies conducted in Nigeria and Saudi Arabia (18,25).

In contrast to previous research (25,2), the lowest rated score in this study was item No 4 *not having an informative induction programme and informative training manual*. Providing a strong induction programme and communicating the curriculum to the trainees is very crucial for orienting the trainees to duties, responsibilities, training methods, learning opportunities, core competencies to be mastered and assessment tools. Corroborating this, in his article 'Ten Questions to Ask when Planning a Course or Curriculum', Harden emphasises the significance of communicating the curriculum to trainees (19).

In this study, the residents' perceptions of role autonomy were more positive, in agreement with similar studies

Table 5. Mean score difference test of each item of PHEEM among gender

PHEEM subscales	Total mean study score Female	Total mean study score Male	P.value
Perceptions of teaching	20.8(13.1)	21.6(12.1)	0.675
Perceptions of role autonomy	27.5(12.6)	28.1(12.2)	0.732
Perceptions of social support	21.4(9.6)	21.5(8.9)	0.908
Total PHEEM Score	69.6(32.7)	71.3(30.6)	0.74

Table 6. Mean score difference test of each item of PHEEM among years of training

PHEEM subscales	Total mean study score					
	first year	The second year	The third year	The fourth year	Other specify	P.value
Perceptions of teaching	23.1(11.3)	17.9(11.1)	15.2(11.3)	20.0(13.8)	18.0(8.6)	0.052
Perceptions of role autonomy	25.8(10.5)	23.3(9.9)	24.1(10.4)	28.9(14.9)	24.0(10.3)	0.44
Perceptions of social support	20.8(9.3)	19.4(8.3)	18.1(7.5)	21.4(9.6)	16.0(11.2)	0.51
Total PHEEM Score	69.7(25.8)	60.6(25.2)	57.5(26.3)	70.4(35.8)	58.0(27.6)	0.24

conducted in Iran and Pakistan (14,16). It has been reported that positive perceptions of role autonomy are vital for personal development, lifelong learning and career enhancement (26–28).

Furthermore, the participants reported their perceptions of teaching at 28.3 ± 12.6. This finding illustrates the necessity of reskilling—i.e., retraining the trainees with essential skills in clinical teaching, assessment and supervision. This result coincides with another 2019 study conducted in Sudan by Taha et al., addressing factors affecting the quality of the training in this same programme [20]. Faculty development programmes for clinical educators could help enhance these skills, which are essential for delivering training to residents (29).

The results of this study also highlighted that perceptions about social support were 21.9 ± 9.2, which indicated that the residents considered the LE unpleasant. This score was similar to that found in a 2018 study conducted by Attia et al. in Pakistan (30) and lower than that found by several other studies globally (9,14,15,17). Particular attention should be given to this domain, since it comprises critical issues in the provided training (Table 4). A growing body of literature stresses the role of the social environment on enhancing students' learning (31,32), and many learning theories have also pointed out this issue (33).

In the present study, there were no complete, real, positively valued items with a mean score of ≥ 3; six items were below a mean score of 2, while the other items rested between 2 and 3.

In 2009, Roff (1) concluded that all items with scores between 2 and 3 indicate a more positive/suitable LE, but require improvement. In Sudan, effective partnership and collaboration between the SMSB, the Ministry of Health, trainees and hospital directors are urgently needed to correct these items.

The residents in this study perceived their LE with a global mean score of 72.4 ± 31.5 out of 160, which indicates significant problems in the programme's LE and is consistent with Algaidai's 2017 study conducted in Saudi Arabia (77.7) but higher than the value found in Khoja's 2015 research in Saudi Arabia (67.1) (34,25). Several studies worldwide have reported much higher global mean scores than this study has (35–39).

This study possesses many strengths, including a large sample size and a high response rate, in addition to its being conducted in more than one hospital. However, it has some limitations as well. Its sample was taken from a single programme—internal medicine residency training—and, thus, it is difficult to generalise these findings to other postgraduate programmes and/or residency programmes in the SMSB and in other teaching hospitals. The research has also been conducted in only two Sudanese cities: Khartoum and Wedmadani. Therefore, it would be advisable to conduct similar studies on a larger scale, covering the remaining Sudanese states and other training programmes.

This study has revealed significant challenges in the LE of Sudan's internal medicine residency programme. These findings are alarming, and more attention and effort must be given to rectifying these issues, especially those concerning the poorly rated points in this study. Urgent intervention and corrections are needed to make the LE more conducive and, by extension, the learning more supportive and motivating for trainees. To be adequately addressed, these issues require coordination and collaboration between the various stakeholders of this programme.

Ethical considerations:

Ethical issues (Including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc.) have been completely observed by the authors.

ACKNOWLEDGEMENT

This work would have been impossible without the support of the residents themselves, who distributed the questionnaires and collected the data. The authors are also especially indebted to the registrar's office at the SMSB and to the training coordinators who facilitated communication with the participants.

Financial Support: None

Conflict of interest: None

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