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Research article

Differences in perceptions of capability, autonomy, and expectations between residents and surgical team members in executing EPAs in Ethiopian medical education

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ABSTRACT

Background: Entrustable Professional Activities (EPAs) are units of professional practice that are defined as tasks or responsibilities that are entrusted to an unsupervised execution by a trainee. In 2021, a framework of 29 EPAs was developed for surgical residency training programs in Ethiopia, with the goal of residents being able to perform independently by the time they graduate. However, studies show that surgical residents lack confidence and are unable to execute EPAs autonomously upon graduation, and concerns have been raised about graduate competencies in EPA execution. The goal of this research is to assess how surgical team members judge/perceive residents' performance in executing these EPAs autonomously at the time of graduation and how residents rate their own capability and autonomy in executing EPAs in order to systematically introduce and implement EPAs in Ethiopian medical education

Methods: A survey was conducted in the Departments of Surgery at four residency training institutions in Ethiopia. All eligible surgical team members and final-year general surgery residents were invited to participate. Surgical team members were asked to rate the observed performance of a group of graduating surgical residents in each of the 29 EPAs, and residents were asked to rate their own capability in executing EPAs. The analysis focused on variations in performance ratings between surgical team members and residents, as well as across surgical team members.

Results: A total of 125 surgical team members and 49 residents participated in this study. Residents rate their competence in performing these EPAs higher than surgical team members, mean 4.2 (SD = 0.63) vs. 3.7 (SD = 0.9). A statistically significant difference in perceptions of capability, autonomy, and expectations in executing EPAs was observed between the two groups of study ($p = 0.03$, CI: 0.51–0.95), as well as within surgical team members ($p < 0.001$).

Conclusions: Differences in perceptions of capability, autonomy, and expectations between residents and surgical team members, as well as within faculty members, were seen in executing EPAs. There were concerns about graduate surgical residents' competence to execute EPAs

Abbreviations: EPAs, Entrustable professional activities; CI, Confidence interval; SD, Standard deviation; OT, Operating theatre.

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autonomously at the time of graduation. Surgical team members perceived that a set of graduating surgical residents are not yet safe to perform these EPAs independently (without supervision) and still requires distant supervision.

1. Introduction

Assessment in a real-world clinical practice setting is critical to the success of a residency training program. As the residents progress through the competencies, their need for supervision with an overall task decreases. As the resident's knowledge, attitudes, and skills develop, he or she progresses from didactic to practice-based settings with decreasing supervision until he or she can be completely entrusted with a given task by the faculty [1].

Trust is essential in clinical practice and is an important component of educators' assessment of clinical learners. There must be trust that the resident has the necessary knowledge, skills, and attitudes to perform professional activities safely and effectively at the appropriate supervision levels [2–4]. Trust enables the resident to gain increasing levels of participation and responsibility in the workplace, thereby developing competence for future practice [4–6].

Entrustable professional activities (EPAs) are an emerging strategy for supervision based on a supervisor's trust in a trainee to perform a given activity [2,3]. EPAs are units of professional practice, defined as tasks or responsibilities to be entrusted to the unsupervised execution by a trainee once he or she has attained sufficient specific competence [4–10]. EPAs form part of essential professional work in a given context and should be entrusted only to those individuals who have adequate competency to carry them out. Competency assessment based on EPAs defines the degree of independence or supervision with which a trainee can be entrusted to perform a workplace task [11].

Traditional competency assessment methods in surgical residency training are intended to test a specific competency; they do not evaluate the full range of roles that a qualified surgical resident is expected to perform [10,12–14]. Additionally, there is a lack of a clearly defined source of information against which to measure progress and make a summative entrustment decision. As a result, entrustment decisions (high-stakes judgments with significant implications for trainees, training programs, and patients) are made through informal observation, frequently on the premise that time spent in surgical residency training program confers a level of competency [4]. Furthermore, the absence of meaningful competency assessments in surgical residency training programs has resulted in inconsistent entrustment and wildly variable competency among graduates [15].

Therefore, the EPA-based assessment formalizes these day-to-day clinical entrustment decisions by providing a framework for supervisors to gather evidence and document what they are currently doing - applying their professional judgment based on observations of surgical residents' performance [16,17].

During their training, surgical residents in Ethiopia were not allowed to perform the core professional activity, or EPA, without supervision. Surgical residents in the Ethiopian residency training program either perform core professional's tasks and responsibilities with direct, pro-active supervision, i.e. with a supervisor physically present in the room, or act with indirect, re-active supervision, i.e. readily available on request. After graduation, residents have the right to act independently (without supervision) [18].

In light of this, in 2021, a framework of 29 validated and accepted EPAs for surgical residency training programs in Ethiopia was developed, employing an iterative expert group consensus process to transform traditional assessment into entrustment decisions. The goal is for each surgical resident who completes the training to be able to perform each of the EPAs safely and independently without supervision [19].

However, studies show that surgical residents lack confidence and are unable to execute EPAs autonomously after graduation [20–22] and stakeholders lack confidence and trust that graduate surgical residents have the necessary competence to safely and effectively perform their professional practice [23].

As a result, the goal of this research is to assess how surgical team members judge/perceive residents' performance in executing these EPAs autonomously at the time of graduation and how residents rate their own capability and autonomy in executing EPAs in order to systematically introduce and implement EPAs in Ethiopian medical education.

2. Methods and materials

2.1. Design, setting, and materials

We conducted a cross-sectional survey in the Departments of Surgery at St. Paul Hospital Medical Millennium College (SPHMMC), University of Gondar (UoG), Jimma University (JU), and Adama Medical Colleges (AMC) in Ethiopia from June 21 to August 21, 2021. These institutions are among the country's major residency training centers and perform a large number of surgical procedures each year (more than 3000 different procedures).

Participants in the study included surgical team members (general and sub-specialized surgeons, anesthetists, and Operating Theatre (OT) nurses with two years or more of experience in surgical residency training. Furthermore, general surgery residents who had completed their training and were about to graduate (final year general surgery residents) were invited to take part in the study.

2.2. Data collection instrument

The survey instrument contained all the 29 end-of-training EPAs (see supplementary file Table 1) for surgical residents in Ethiopia [19] and the recommended standard framework of supervision levels were used to judge resident performance on a 5-point Likert scale [5,24].

Supervision levels are defined as: 1 - not safe to perform the task (safe only to observe), 2 - safe to perform under direct supervision, 3 - safe to perform under indirect supervision, 4 - safe to perform independently with oversight, 5 - safe to supervise others. Summative entrustment decisions for an EPA at level 4 should be regarded as certification or a license to practice for that particular unit of professional practice [5,24].

The survey questionnaire also contained questions about participants' socio-demographic information, clinical specialization, and years of experience (see supplementary file Table 2). In the survey, surgical team members were asked to rate the observed performance of a group of graduating surgical residents in each of the 29 EPAs. This means that the surgical team members rated the residents' performance as a group rather than as individuals. Residents were asked to rate their own capabilities in performing each of the 29 EPAs. During a morning general session, we fully briefed all participants on the purpose and procedures of the study and obtained informed verbal consent. This study was conducted with the approval of the Ludwig-Maximilians-University of Munich and Ethiopian Public Health Association institutional review board.

2.3. Analysis

Mean and standard deviation of performance scores were calculated for surgical team and resident evaluations separately. A two-sample independent *t*-test (t-value and p-value) was used to determine if the mean rating of performance by the two groups (surgical team and residents) differed significantly and Cohen's d to assess size of the mean difference. A one-way between-groups analysis of variance was conducted to explore the impact of clinical area of specialization on the rating of residents' performance in executing EPAs.

3. Results

Out of a total of 137 eligible surgical team members (i.e., two years or more experience in surgical residency training), a total of 125 surgical team members participated in this study (response rate = 91.2%). Of them, 42 were attending surgeons (general and sub-specialist surgeons), 52 were OT nurses and 31 were anesthetists. Most surgical team members were males (77.6%) and had 10 years or fewer work experience (81.6%). Furthermore, all 49 (M = 48, F = 1) general surgery residents from the four residency training institutions took part in the study (Table 1).

Both residents and surgical team members rated the perceived level of EPA performance with a minimum score of 1 and a maximum of 5, with a mean rating of 4.2 and 3.7, respectively (Fig. 1).

A statistically significant difference was observed in the mean scores for the two different groups in 23 out of 29 EPAs (four global performances and nineteen operative skill EPAs) (Table 2).

An independent two-sample *t*-test with unequal variance assumption (F = 0.57, numerator df = 48, denominator df = 124, p = 0.03) revealed a statistically significant difference between surgical team members and residents in the overall (composite) mean rating of resident's performance, with the size of the mean difference being intermediate (effect size Cohen's d = 0.6). (Table 3).

A one-way between-groups analysis of variance was performed to determine whether there was a difference in the rating of residents' performance in executing EPAs among surgical team members. Surgical team members were divided into three groups according to their area of specialization (Group 1: attending surgeons; Group 2: OT nurses; and Group 3: anesthetists/anesthesiologists). There was a statistically significant difference at the $p < 0.02$ (at Bonferroni adjusted alpha level of 0.02) level in mean rating scores for

Table 1
Demographic characteristics of study participants by their residency training institutions.

Characteristics/Variables		Surgical team (n = 125)					Graduating general surgery residents (n = 49)				
		SPHMMC	UOG	JU	AMC	Total	SPHMMC	UOG	JU	AMC	Total
Sex	M	41	22	18	16	97	8	15	17	8	48
	F	22	2	3	1	28	1	0	0	0	1
	Total	63	24	21	17	125	9	15	17	8	49
Year of experience	2–4	28	7	11	3	49					
	5–10	24	12	4	13	53					
	>10	11	5	6	1	23					
	Total	63	24	21	17	125					
Area of clinical specialization	Surgeons[a]	8	13	12	9	42					
	Anesthetists	11	7	7	6	31					
	OT nurse	44	4	2	2	52					
	Total	63	24	21	17	125					

[a] Surgeons (General and sub-specialized), SPHMMC = St. Paul Hospital Medical Millennium College, UoG = University of Gondar, JU = Jimma University and AMC = Adama Medical Colleges.

Table 2
Mean difference between study groups in the rating of each EPA performance.

EPA #	Study group	N	Mean	SD	Mean difference	t-value	p-value	95%CI
1.	Resident	49	4.76	.43	0.62	6.01	.001[a]	[0.41, 0.82]
	Surgical Team	125	4.14	.92				
	Total	174						
2.	Resident	49	4.55	.61	0.52	3.59[a]	0.001[a]	[0.23, 0.80]
	Surgical Team	125	4.03	.93				
	Total	174						
3.	Resident	49	4.71	.46	0.43	4.99	0.001[a]	[0.26, 0.60]
	Surgical Team	125	4.28	.64				
	Total	174						
4.	Resident	49	4.47	.50	0.50	3.93[a]	0.001[a]	[0.25, 0.75]
	Surgical Team	125	3.97	.83				
	Total	174						
5.	Resident	49	4.33	.47	0.05	0.46	0.64	[-0.15, 0.24]
	Surgical Team	125	4.28	.84				
	Total	174						
6.	Resident	49	4.63	.49	0.10	1.08	0.28	[-0.08,0.27]
	Surgical Team	125	4.54	.63				
	Total	174						
7.	Resident	49	4.33	.55	0.08	0.68	0.49	[-0.14, 0.30]
	Surgical Team	125	4.25	.93				
	Total	174						
8.	Resident	49	4.22	.74	−0.14	−1.08[a]	0.28	[-0.40,0.11]
	Surgical Team	125	4.37	.80				
	Total	174						
9.	Resident	49	4.55	.61	0.19	1.64	0.10	[-0.03, 0.42]
	Surgical Team	125	4.36	.85				
	Total	174						
10.	Resident	49	4.31	.94	0.80	4.63[a]	0.001[a]	[0.46, 1.14]
	Surgical Team	125	3.50	1.06				
	Total	174						
11.	Resident	49	4.88	.33	0.51	6.55	0.001[a]	[0.35, 0.66]
	Surgical Team	125	4.37	.69				
	Total	174						
12.	Resident	49	4.67	.52	1.03	8.12	0.001[a]	[0.78, 1.28]
	Surgical Team	125	3.64	1.16				
	Total	174						
13.	Resident	49	4.63	.49	0.83	7.06	0.001[a]	[0.60, 1.06]
	Surgical Team	125	3.80	1.06				
	Total	174						
14.	Resident	49	4.08	.64	1.34	10.67	0.001[a]	[1.08, 1.58]
	Surgical Team	125	2.74	.96				
	Total	174						
15.	Resident	49	3.96	.64	1.19	9.54	0.001[a]	[0.94, 1.43]
	Surgical Team	125	2.77	.94				
	Total	174						
16.	Resident	49	4.14	.82	0.89	5.75[a]	0.001[a]	[0.58, 1.19]
	Surgical Team	125	3.26	.95				
	Total	174						
17.	Resident	49	3.16	1.14	1.03	5.82	0.001[a]	[0.67, 1.37]
	Surgical Team	125	2.14	.74				
	Total	174						
18.	Resident	49	4.08	.89	1.32	8.32[a]	0.001[a]	[1.00, 1.63]
	Surgical Team	125	2.76	.96				
	Total	174						
19.	Resident	49	3.43	1.02	0.53	2.84[a]	0.005[a]	[0.16, 0.90]
	Surgical Team	125	2.90	1.14				
	Total	174						
20.	Resident	49	4.86	.35	0.23	2.94	0.004[a]	[0.17, 0.88]
	Surgical Team	125	4.62	.68				
	Total	174						
21.	Resident	49	4.71	.46	0.63	5.22[a]	0.001[a]	[0.39, 0.87]
	Surgical Team	125	4.08	.80				
	Total	174						
22.	Resident	49	4.76	.43	0.69	5.59[a]	0.001[a]	[0.44, 0.93]
	Surgical Team	125	4.06	.82				
	Total	174						
23.	Resident	49	3.84	1.03	0.34	2.01[a]	0.046	[0.00, 0.67]
	Surgical Team	125	3.50	1.00				

(*continued on next page*)

Table 2 (*continued*)

EPA #	Study group	N	Mean	SD	Mean difference	t-value	p-value	95%CI
	Total	174						
24.	Resident	49	4.65	.48	0.61	4.55[a]	0.001[a]	[0.34, 0.86]
	Surgical Team	125	4.05	.88				
	Total	174						
25.	Resident	49	3.96	.50	0.47	4.03	0.001[a]	[0.24, 0.70]
	Surgical Team	125	3.49	1.04				
	Total	174						
26.	Resident	49	3.84	.59	0.40	3.09	0.002[a]	[0.14, 0.65]
	Surgical Team	125	3.44	1.08				
	Total	174						
27.	Resident	49	4.33	.92	1.00	6.25[a]	0.001[a]	[0.68, 1.31]
	Surgical Team	125	3.33	.96				
	Total	174						
28.	Resident	49	4.27	.70	0.35	2.46[a]	0.015[a]	[0.06, 0.62]
	Surgical Team	125	3.92	.88				
	Total	174						
29.	Resident	49	4.57	.50	0.70	6.14	0.001[a]	[0.47, 0.92]
	Surgical Team	125	3.87	.99				
	Total	174						

[a] The effect is statistically significant at 0.05 level.

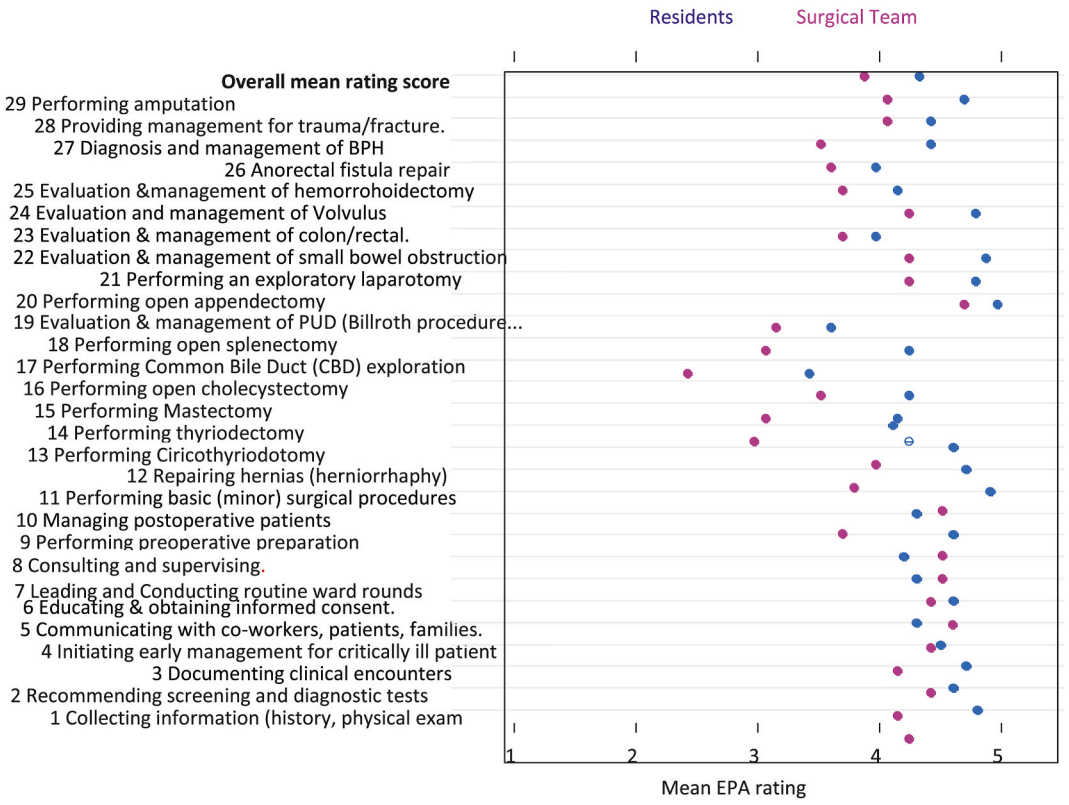

Fig. 1. Mean rating of EPA performance of graduating general surgery residents by the study groups.

Table 3
Independent Samples *t*-test comparing the composite mean rating score between the two groups of study.

Study group	N	Composite mean score	Pooled SD	t-value at 133 df	p-value	95% CI	Effect size (Cohen's d)
Residents	49	4.2	0.63	6.57	.03	[0.51, 0.95]	0.6
Surgical team	125	3.7	0.90				

*Mean difference significant at 0.05 level.

the three groups in a total of 17 EPAs (2 global performance and 15 Operating skill EPAs, (EPA # 1, 4, 8–12, 14, 15, 18, 19, 21, 22, 24, 27–29). Post-hoc comparisons using the Tukey HSD test revealed that the mean rating score for attending surgeons differed significantly from OT nurses in 10 EPAs (2 global performances (EPA # 1, 4) and 8 operative skill EPAs (EPA # 8, 10, 11, 12 14, 15, 19, 24) and from anesthetists/anesthesiologists) in 7 operative skill EPAs (EPA # 9, 18, 21, 22, 27–29). Similarly, anesthetists' mean rating score differed significantly from OT nurses' in 11 operative skill EPAs (# 8–12, 14, 15, 18, 19, 27, 28). (see supplementary file for detailed result Table 3).

4. Discussion

The purpose of this study was to look into the perspectives of surgical team members and graduating general surgery residents on EPA performance in surgery residency programs in the context of Ethiopian medical education. The study builds on previous work that developed EPAs for surgical residency training in Ethiopia, making it relevant to systematically introduce and implement EPAs as an assessment methodology. In this study, members of the surgical team were asked to rate the observed performance of a group of graduating surgical residents in each of the 29 EPAs. We discovered that surgical team members rated residents' competence in carrying out EPAs lower than residents did. The results of this study revealed that the average rating of resident performance by surgical team members was 3.7 (lower than summative entrustment decisions for an EPA at level 4). The finding is consistent with other studies in which stakeholders have expressed concerns about graduating general surgery residents' ability to carry out EPAs [23]. According to the recommended standard framework of supervision levels [5,24], this means that residents perform EPAs under indirect supervision at the time of graduation (residents act with supervisor immediately available). This implies that surgical team members believe that a group of graduating surgical residents are not yet safe to perform these EPAs independently (without supervision) at the time of graduation, and that distant supervision is still required, and that surgical team members are concerned about graduate competencies in executing EPA autonomously [21].

However, a body of research found that residents rate their competence in carrying out EPAs higher than surgical team observation [25–30]. These findings are consistent with the findings of the present study. The self-assessment scores of residents were significantly higher than the assessments of surgical team members. In fact, students' self-evaluations are frequently higher than faculties' score [31,32]. This could be due to residents' overconfidence in their abilities and/or a lack of mastery of self-assessment skill [33]. However, regardless of the rating, self-assessment allowed residents to develop self-perceptions. Self-perceptions of competence, which are a component of self-efficacy, refer to beliefs about one's general ability or knowledge and skills to perform well. Students' self-efficacy involves estimating what they can do and the likelihood of success [31–34].

In this study, there was disagreement between the residents' and surgical team members' judgments in carrying out EPAs. Surgical team expected residents to still require supervision by graduation, whereas residents were more confident in carrying out EPAs. The discordance between resident and surgical team evaluations of resident performance has been the subject of research over the last ten years [25]. The disparity in EPA performance judgments observed in our study between resident and surgical teams has numerous implications.

First, this discordance may be due in part to either these EPAs' framework lacking sufficient detail in describing the scope, the necessary prerequisite knowledge, skills, and attitudes and performance criteria that form the basis for entrustment decisions, or performance criteria that might not be transparent and understandable, preventing them from effectively judging how well residents met the criteria. According to research, drawing attention to the performance criteria that are relevant for a particular learning task improves their understanding of the criteria, which leads to better task performance and self-assessment skills [35].

Second, the discordance implies that either residents may have an inaccurate self-perception and/or surgical team members may not assess senior residents critically, therefore not appropriately tailoring their instruction to the needs and competency of the resident [36,37] and not providing accurate assessment [38]. It is not very surprising those residents have some form of competence illusion regarding their own learning curve. Even specialists fail to acknowledge their limits sometimes [39].

Third, the discordance in judgment of EPA performance between resident and surgical teams also implies that residents may not receive feedback from surgical team members or the feedbacks may not accurately have processed by the residents. Quality formative and summative feedback is essential for learning, and programs are expected to provide each fellow with evaluation of performance with feedback. In turn, fellows are expected to be able to incorporate formative feedback into daily practice. However, if a resident does not receive or accurately process surgical team formative or summative feedback then they can develop an inaccurate perception of their abilities [38,40].

Furthermore, there were differences in the overall mean rating of residents' EPA performance across surgical team members' specializations (attending surgeons, OT nurses, and anesthetists/anesthesiologists). This might be due to surgical team members judging residents' performance based on their level of expertise rather than performance criteria. This implies that either there might not be clearly defined performance criteria for basis for formal entrustment decisions, or the criteria may not be transparent and understandable to surgical team members, preventing them from judging how well residents met the criteria effectively. Furthermore, the disparity in EPA performance judgments between resident and surgical teams may indicate that the program did not have standard protocols and practices in place among surgical team members to make formal entrustment decisions.

The finding assists residency programs to systematically introduce and implement EPA-based assessment, as well as informing decisions on resident performance that should be made on the basis of trust rather than the assumption that the amount of time spent in postgraduate training, and the need for having clear performance criteria to form the basis for an entrustment decision. However, more work is needed to enable authentic summative entrustment in the core EPAs framework

4.1. Strength and limitation of the study

The study's most significant strength is that it used measuring tools completed by interdisciplinary surgical team members in a resident's sphere of influence. This interdisciplinary EPA assessment provides a more complete picture of residents' performance.

The study's limitations include self-assessment of performance. Self-assessment can be subjective because residents may not be sincere and may even over-evaluate their own performance. The surgical team members are not assessing a single resident but rate the observed performance of a group of graduating surgical residents in each of the 29 EPAs. Furthermore, study participants were asked to rate the performance of the core EPA statement without providing a detailed description, which may have affected their rating

5. Conclusion

Differences in perceptions of capability, autonomy, and expectations between residents and surgical team members, as well as within faculty members, were seen in executing EPAs. There were concerns about graduate surgical residents' competence to execute EPAs autonomously at the time of graduation. Surgical team members perceived that a set of graduating surgical residents are not yet safe to perform these EPAs independently (without supervision) and still requires distant supervision. Residents, however, were taught that they were ready to practice independently. The perception gap that exists between resident and surgical teams poses a potential problem in the education and health care systems.

Declarations

Author contribution statement

Equlinet Misganaw Amare: Conceived and designed the experiments; Performed the experiments; Analyzed and interpreted the data; Wrote the paper. Matthias Siebeck; Tegbar Yigzaw; Martin R. Fischer; Markus Berndt: Conceived and designed the experiments; Contributed reagents, materials, analysis tools or data. Mekdim Tadesse: Contributed reagents, materials, analysis tools or data.

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Data availability statement

Data included in article/supp. material/referenced in article.

Declaration of interest's statement

The authors declare no conflict of interest.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.heliyon.2023.e14316.

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