

# Stroke Disability and Physiotherapy Interventions: A Quantitative Evaluation of Physiotherapy Treatment Approaches' in Zambia

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**Abstract** Worldwide, cerebrovascular accidents (stroke) are the second leading cause of death and the third leading cause of disability. As a result of physical disability after stroke, most of the patients need physiotherapy. Due to different backgrounds, knowledge, clinical experiences, personal preferences, and continually developing clinical practices, physiotherapists use different methods to treat their stroke patients. This study was designed to determine physiotherapists' perspective on the physiotherapy interventions for stroke patients at the University Teaching Hospital and Levy Mwanawasa University Teaching Hospital in Lusaka. This was a descriptive, cross-sectional study which was quantitative in nature. Data was collected through a standardized questionnaire with modifications to fit the scope of the study. A total of 36 participants consisting of 23 Physiotherapists and 13 physiotherapy Technologists from both hospitals contributed to the study, giving an overall response rate of 78.3 percent. The data obtained was analyzed by using descriptive analysis and chi-square test was used to test the association. The results showed that PNF/Brumstrom (92%) was the most taught approach among the respondents in their professional education. The preferred treatment approaches in stroke rehabilitation which are used by Physiotherapists and physiotherapy Technologists are repetitive functional task practice (72%), motor learning (69%) and PNF/Brumstrom (67%). The choice of a particular technique to use in practice was based on clinical experience (91.7%), presentation of the patients (88.9%) and Theoretical knowledge (86.1%). The main contributing factor to not choosing certain treatment approaches were lack of training (86.1%), concept of the treatment approach not being clear (75.0%) and lack of equipment (69.4%). Out of 36 respondents 27 were involved in continuing education on stroke rehabilitation and 9 were not involved. There is need to incorporate the newer physiotherapy treatment approaches into the physiotherapy practice as the scope of practice that reflects the latest evidence base improves the provision of services and contributes to better and cost-effective physiotherapy interventions for stroke patients.

**Keywords:** Physiotherapy intervention, Treatment approach, Stroke, physiotherapy, Rehabilitation

## 1. Introduction

Worldwide, stroke and its disability correlates are the second leading cause of death and the third leading cause of disability (World Health Organization, 2012). Stroke may affect physical, cognitive, social, and emotional functioning. Stroke recovery is heterogeneous in terms of outcome, and it is estimated that 25% to 74% of the 50 million stroke survivors worldwide require some

assistance or are fully dependent on caregivers for activities of daily living (ADL) after stroke (Miller *et al.*, 2010). Over the last four decades, the incidence of stroke in low- and middle-income countries has more than doubled (Feigin *et al.*, 2014). With the improvement in healthcare, more people survive stroke and then have to cope with the negative physical, psychological, social, and functional sequelae (Opara & Jaracz, 2010). However, in Zambia the actual incidence and prevalence of stroke have not been established.

As a result of physical disability after stroke, most of the patients need

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physiotherapy. Physiotherapy remains the key component of stroke rehabilitation focusing on the recovery of physical function and enhancement of independent living. A variety of physiotherapy interventions improve functional outcomes, even when applied late after stroke (Ferrarello *et al.*, 2011). Treatment of hemiplegia after stroke continues to be a challenging and often frustrating experience for clinicians. In the past, stroke services have been criticized for being poorly coordinated and providing insufficient therapy, information, and support (Rahman *et al.*, 2012).

Over the years, various approaches to physical rehabilitation have been developed, according to different ideas about how people recover after a stroke (Pollock *et al.*, 2014). These approaches have been adopted by physiotherapists in stroke rehabilitation. Physical rehabilitation, comprising a selection of components from different approaches, is effective for recovery of function and mobility after stroke. Due to different backgrounds, knowledge, clinical experiences, personal preferences, and continually developing clinical practices, physiotherapists use different methods to treat their stroke patients (Umair *et al.*, 2014).

Disability and Rehabilitation literature is evolving with every passing day; therefore, reading literature should be an integral part of their professional responsibility. Moreover, it helps the clinician to choose up-to-date interventions in order to improve effective rehabilitation practices for their patients. (Umair *et al.*, 2014). Sanjib & Rinat (2013) stated that having qualifications in physiotherapy does not always mean that the physiotherapist is delivering good practice. Physiotherapists should have sound knowledge of current issues on physiotherapy. This means that they must have up to date knowledge about new techniques for better practice. This study was designed to determine physiotherapists' perspective on the physiotherapy intervention for stroke patients at the University Teaching Hospital and Levy Mwanawasa University Teaching Hospital in Lusaka.

## 2. Research Methodology

### 2.1 Study design

This was a descriptive, cross-sectional study and quantitative in nature. Data was collected through a standardized questionnaire with modifications to fit the scope of the study. The questionnaire was based upon the published survey in the field of stroke rehabilitation. It was developed by Natarajan *et al.*, (2008). The questionnaire was also used in a study by Umair *et al.*, (2014) in Pakistan to understand the current clinical practices in stroke rehabilitation in Lahore (Chuni, V, Chiluba, Mwango, Nkandu, Shula, 2018).

### 2.2 Study materials

The study was conducted at the adult Physiotherapy department of the University Teaching Hospital and Levy Mwanawasa University Teaching Hospital. The University Teaching Hospital (UTH) is the biggest government owned hospitals in Lusaka followed by the Levy Mwanawasa University Teaching Hospital. The two hospitals are the most financed from the state budget and have more staff members. The targeted study population included all the Physiotherapists and physiotherapy Technologists working at the mentioned hospitals (18 from LMUTH and 28 from UTH). The sample size of the study included all physiotherapists and physiotherapy technologists working in these selected health facilities in Lusaka. Convenience sampling method was used in this study. A verbal and written informed consent was obtained before giving the questionnaire to respondents. The questionnaire did not contain any personal questions. Therefore, it did not pose any threat to participants' confidentiality in any way. However, an identification number was assigned to each questionnaire to protect the identity of the participants.

### 2.3 Statistical Analysis

The data was analyzed using the SPSS software for analyzing quantitative research data. The data collected was coded in numeric form for processing and was entered on the version 22 spread sheet. Data was analyzed descriptively by computing the frequencies and percentages for categorical variables. Results were expressed in frequency and percentage. A Chi square test with a significance of  $p < 0.05$  was used to determine

the relationship between treatment approaches taught in professional education and treatment approaches currently being practiced. The research was approved by the University of Zambia, School of Health Sciences Undergraduate Research Ethics Committee. Permission to conduct the study was granted by the hospital managements of the mentioned hospitals. Permission letters from the hospital management was submitted to the physiotherapy Head of Departments of the mentioned hospitals and the participants gave informed consent.

### 3. Results and Discussion

#### 3.1 Participants' demographics characteristics

This study was designed to determine physiotherapists' perspective on the physiotherapy interventions for stroke patients at the University Teaching Hospital and Levy Mwanawasa University Teaching Hospital in Lusaka. A total of 36 respondents participated in this study, giving an overall response rate of 78.3 percent.

Table 1 summarizes the demographic distribution of the respondents. Of the 36 respondents 23 (63.9%) were females and 13 (36.1%) were males. The age for most of the respondents was between 31 and 40 years (50.0%). Out of the 36 respondents, 3 had masters, 20 had degree qualifications and 13 had diploma. Most of the respondents 13 (36.1%) had been treating stroke patients for about 6 to 10 years.

#### 3.2 Treatment Approaches in Stroke Rehabilitation

Figure 2 shows that PNF/Brumstrom (92%) was the most taught approach among the respondents, followed by motor learning (78%), repetitive functional task practice (75%) and Bobath/NDT (72%). A few were taught constrained induced (22%), high-intensity therapy (25%) and functional electrical stimulation (39%) in their professional education. Even though PNF/Brumstrom was the most learned treatment approach, it was noted that repetitive functional task practice (72%) was the most common treatment approach of choice among the respondents followed by motor learning (69%) and PNF/Brumstrom

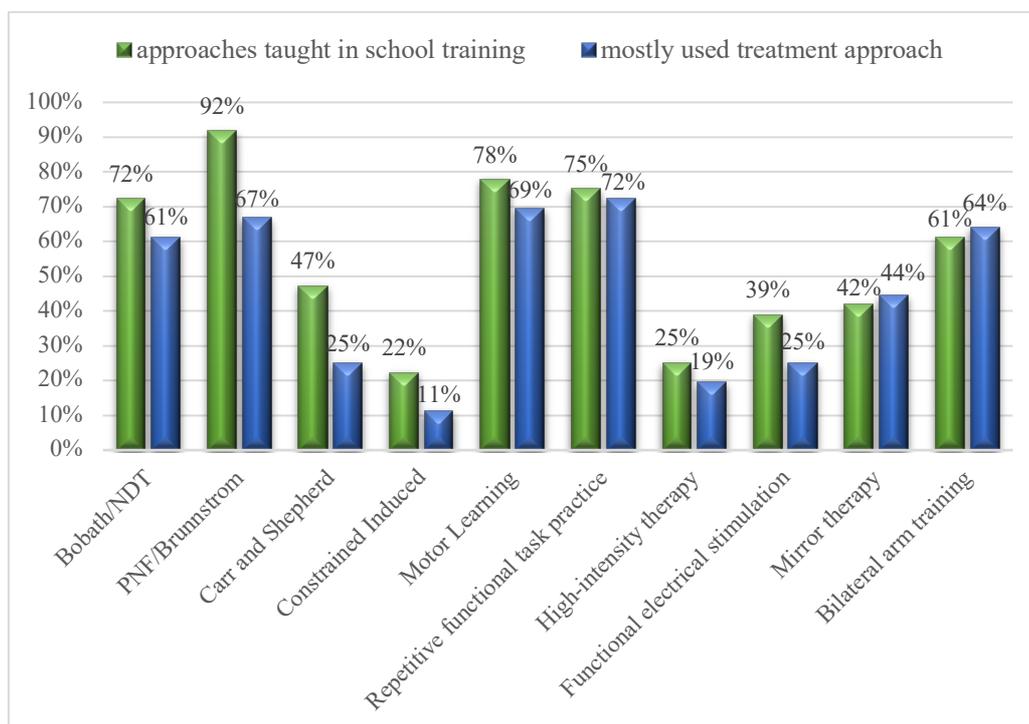
(67%). The least practiced was constraint induced (11%) and high intensity therapy (19%).

**Table 1.** Demographic Distribution of the respondents (n=36)

Demographic Characteristics	Frequency	Percentage (%)
<b>Sex</b>		
Male	13	36.1%
Female	23	63.9%
<b>Age</b>		
21 - 30 years	9	25.0%
31 - 40 years	18	50.0%
41 - 50 years	9	25.0%
51 - 60 years	0	0.0%
61 & Above years	0	0.0%
<b>Profession attainment</b>		
Diploma	13	36.1%
Degree	20	55.6%
Masters	3	8.3%
PhD	0	0.0%
<b>Years of treating stroke patients</b>		
0 - 5 years	9	25.0%
6 - 10 years	13	36.1%
11 - 15 years	6	16.7%
16 - 20 years	4	11.1%
20 and above years	4	11.1%

The focus in the cross tabulation (table 2) was to assess the relationship between treatment approaches taught in professional education and treatment approaches currently being practiced. It was noted that the treatment approaches that were mostly practiced are those approaches that were mostly taught. A chi square test was done and the following were significant at  $p=0.05$ ; Bobath/NDT (0.006), Repetitive functional task practice (0.011) and bilateral arm training (0.000) while PNF/Brumstrom (0.213) and motor learning (0.078) were not significant. Furthermore, the results show that the approaches that were rarely taught were rarely practiced among the respondents. The following were statistically significant; Carr & Shepard (0.001), mirror therapy (0.000), functional electrical stimulation (0.000) and high-intensity therapy (0.000) while constraint

Induced (0.363) was not significant.



**Fig 1.** Stroke treatment approaches taught in school training and mostly used in practice ( $n=36$ ). (NB: The total percentage was not adding up to 100% because respondents were allowed to choose multiple treatment approaches).

**Table 2.** The relationship between Treatment approaches taught in professional education and treatment approaches currently practiced ( $n=36$ ).

Treatment approach taught in school	Treatment approach used in practice				P value
	Mostly	Rarely	Never	Total	
<b>Bobath/NDT</b>					<b>0.006</b>
Yes	20 (55.6%)	4 (11.1%)	2 (5.6%)	26 (72.2%)	
No	2 (5.6%)	4 (11.1%)	4 (11.1%)	10 (27.8%)	
<b>PNF/Brunnstrom</b>					<b>0.213</b>
Yes	23 (63.9%)	8 (22.2%)	2 (5.6%)	33 (91.7%)	
No	1 (2.8%)	1 (2.8%)	1 (2.8%)	3 (8.3%)	
Total	24 (66.7%)	9 (25.0%)	3 (8.3%)	36 (100.0%)	
<b>Carr and Shepherd</b>					<b>0.001</b>
Yes	8 (22.2%)	7 (19.4%)	2 (5.6%)	17 (47.2%)	
No	1 (2.8%)	5 (13.9%)	13 (36.1%)	19 (52.8%)	
<b>Motor Learning</b>					<b>0.078</b>
Yes	22 (61.1%)	3 (8.3%)	3 (8.3%)	28 (77.8%)	
No	3 (8.3%)	2 (5.6%)	3 (8.3%)	8 (22.2%)	
<b>Constrained Induced</b>					<b>0.363</b>
Yes	2 (5.6%)	1 (2.8%)	5 (13.9%)	8 (22.2%)	
No	2 (5.6%)	5 (13.9%)	21 (58.3%)	28 (77.8%)	
<b>Repetitive functional task practice</b>					<b>0.011</b>
Yes	23 (63.9%)	2 (5.6%)	2 (5.6%)	27 (75.0%)	
No	3 (8.3%)	3 (8.3%)	3 (8.3%)	9 (25.0%)	

Treatment approach taught in school	Treatment approach used in practice				P value
	Mostly	Rarely	Never	Total	
<b>High-intensity therapy</b>					<b>0.000</b>
Yes	6 (16.7%)	3 (8.3%)	0 (0.0%)	9 (25.0%)	
No	1 (2.8%)	5 (13.9%)	21 (58.3%)	27 (75.0%)	
<b>Functional electrical stimulation</b>					<b>0.000</b>
Yes	8 (22.2%)	4 (11.1%)	2 (5.6%)	14 (38.9%)	
No	1 (2.8%)	5 (13.9%)	16 (44.4%)	22 (61.1%)	
<b>Mirror therapy</b>					<b>0.000</b>
Yes	13 (36.1%)	1 (2.8%)	1 (2.8%)	15 (41.7%)	
No	3 (8.3%)	3 (8.3%)	15 (41.7%)	21 (58.3%)	
<b>Bilateral arm training</b>					<b>0.000</b>
Yes	20 (55.6%)	1 (2.8%)	1 (2.8%)	22 (61.1%)	
No	3 (8.3%)	4 (11.1%)	7 (19.4%)	14 (38.9%)	

**NB: The total percentage was not adding up to 100% because respondents were allowed to choose multiple treatment approaches.**

36 respondents 27 (75%) were involved in continuing education on stroke rehabilitation and 9 (25%) were not. Table 3 shows that majority of the respondents agreed to all the statements presented regarding the factors that influence their choice of a particular treatment approach. Most of the respondents (91.7%) indicated that clinical experience influenced their choice of a particular treatment approach followed by presentation of the patients (88.9%) and Theoretical knowledge (86.1%). Time taken to perform a treatment technique had less influence on choosing of a particular treatment approach.

Table 4 revealed that lack of training (86.1%), lack of equipment (69.4%), treatment approach with no clear concept (75.0%) and treatment approach less effective (58.3%) contributed to most of the respondents not choosing certain treatment approaches. While majority of the respondents disagreed that lack of time to perform an approach (50.0%) and approaches not being simple to perform (41.7%) contributed to not choosing a particular treatment approach.

**Table 3.** Factors that influence the respondents' choice of a particular treatment approach (n=36)

Factors influencing the choice of a particular treatment technique	Agree	Unsure	Disagree	Total
Lack of training	86.1%	0.0%	13.9%	100%
Lack of equipment	69.4%	8.3%	22.2%	100%
Concept of a technique not clear	75.0%	2.8%	22.2%	100%
Not simple techniques to perform	38.9%	19.4%	41.7%	100%

Personal preference	69.4%	5.6%	25.0%	100%
Clinical experiences	91.7%	0.0%	8.3%	100%
Presentations of the patients	88.9%	2.8%	8.3%	100%
Theoretical knowledge	86.1%	5.6%	8.3%	100%
Time taken to perform a technique	58.3%	16.7%	25.0%	100%
Continuous developing clinical practices	83.3%	8.3%	8.3%	100%

**Table 4** Factors contributing to not choosing a particular treatment approach (n=36)

Factors contributing to not choosing a particular treatment approach	Agree	Unsure	Disagree	Total
Lack of training	86.1%	0.0%	13.9%	100%
Lack of equipment	69.4%	8.3%	22.2%	100%
Concept of a technique not clear	75.0%	2.8%	22.2%	100%
Not simple techniques to perform	38.9%	19.4%	41.7%	100%

Lack of time to perform a technique	38.9%	11.1%	50.0%	100%
Approach less effective	58.3%	11.1%	30.6%	100%

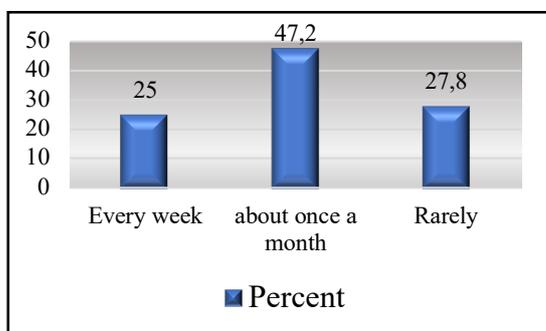
### 3.3 Respondents Involvement in continuing education on stroke rehabilitation

Figure 2 shows that out of 36 respondents 27 (75%) were involved in continuing education on stroke rehabilitation and 9 (25%) were not involved.

According to figure 3 it was noted that 25% of the respondent's study stroke-related literature every week while 47.2% study about once a month and 27.8% reported that they rarely read stroke related literature.

The results show that 71.4% (n=15) of physiotherapy practitioners have strongly heard of OGA and a gait assessment tool and 14.3% (n=3) had never heard of OGA or any assessment tool.

**Fig 2.** Respondents involved in continuing education on stroke rehabilitation (n=36)



**Fig 3.** Respondents study on professional literature on Stroke (n=36).

## 4. Discussion

Knowledge about views of physiotherapists regarding current stroke rehabilitation methods is very important in planning health policies and in conducting continuing education programs in this field (Rahman et al., 2012). In order to understand the current physiotherapy interventions in stroke rehabilitation, this study was conducted to determine physiotherapists' perspective on the physiotherapy interventions for stroke patients at the University Teaching Hospital and Levy Mwanawasa University Teaching Hospital in Lusaka.

The study revealed that PNF/Brunnstrom was the most taught approach among the respondents in their professional education followed by motor relearning and repetitive functional task practice. In contrast to our study results, a study by Umair et al. (2014) in Pakistan found that most of the respondents received PNF and Carr & Bobath training in Universities. Another study done by Natarajan et al. (2008) within the states of Kansas and Missouri found that nearly all the respondents were taught PNF/Brunnstrom and Bobath training in Universities.

The preferred treatment approaches in stroke rehabilitation which are used by Physiotherapists and physiotherapy Technologists are repetitive functional task practice, motor relearning and PNF/Brunnstrom. Similar studies done found that preferred approaches to treat stroke patients was Carr and Shepherd and PNF/Brunnstrom methods (Umair et al., 2014). A study done in Saudi Arabia by Alqahtani et al. (2018) found that Physiotherapists preferred Bobath approach for stroke rehabilitation over newer techniques. In comparison to the preferred treatment approach, a review by Lin and Dionne, (2018) found that the following interventions possess credible evidence to improve functional movement of persons with stroke: cardiorespiratory training, therapeutic exercise (ie, strengthening), task-oriented training (task-specific training), constraint-induced movement therapy (CIMT), mental practice, and mirror therapy. Evidence indicates that physical rehabilitation should not be limited to compartmentalised, named approaches, but rather should comprise clearly

defined, well-described, evidenced-based physical treatments, regardless of historical or philosophical origin (Pollock et al., 2014; Chiluba et al., 2019).

This study showed that only a few were taught CIMT and was mostly used in practice by a minority. Similar results were reported in a study by Alqahtani et al. (2018) who found that only a quarter of therapists learned constraint-induced movement therapy (CIMT) in their college and only a few used CIMT. However current literature strongly supports the use of CIMT. A study by Batool et al. (2015) revealed that CIMT proved to be more statistically significant and clinically effective intervention in comparison to motor relearning programme among the patients aged between 35-60 years. Furthermore, Khan et al. (2011) concluded that constraint induced therapy seems to be the optimal approach to improve arm and hand function and minimize the risk of shoulder pain for patients with minimal to moderate arm hand function after stroke in the intermediate term.

Chi-square tests were done to determine the relationship between treatment approaches taught in professional education and treatment approaches currently being practiced. The study revealed that the treatment approaches that were mostly taught in professional education were mostly practiced among the respondents. Bobath/NDT, Repetitive functional task practice and bilateral arm training were statistically significant. However, PNF/Brunnstrom and motor relearning were not significant. Furthermore, the study revealed that the treatment approaches that were rarely taught in professional education were rarely practiced among the respondents. Carr & Shepard, mirror therapy, functional electrical stimulation and high-intensity therapy were statistically significant while constraint Induced was not significant.

Most of the respondents, their choice of a particular technique to use in treatment was based on clinical experience, presentation of the patients and Theoretical knowledge. These results may support what Abdullahi et al. (2016) stated in their study that the choice of a particular technique by physiotherapists may not be evidence based, but rather from personal preference, experience of the

therapists and relevant presentations of the patients. Clinical experience with good theoretical knowledge that is evidence based can produce an effective treatment protocol that will contribute to a better and cost-effective stroke rehabilitation.

On the factors affecting the choice of certain treatment approaches, most of the respondents indicated lack of training, concept of the treatment approach not being clear, lack of equipment and less effective approaches. Furthermore, majority of the respondents indicated that lack of time and approaches not being simple to perform did not contribute to not choosing a certain treatment approach. Contrary to this study, a study by Bayley et al. (2012) found that the most commonly noted barrier to implementation was lack of time followed by staffing issues, training/education, therapy selection and prioritization, equipment availability and team functioning/communication. Alqahtani et al. (2018) found that two thirds of the clinicians responded that time and availability of resources were the common barriers among clinicians which influence the choice of stroke rehabilitation.

With regards to continuing education, the study showed that three quarter of the respondents were involved in continuing education on stroke rehabilitation. Although most of the respondents are involved in continuing education on stroke rehabilitation, it is clear from the study results that the current treatment approaches that have been studied and are recommended rehabilitation approaches for improving motor outcome are rarely practiced. This could suggest that the respondents had challenges with translating knowledge into practice and Menon et al. (2010) found that personal barriers, such as the lack of confidence and skills to interpret, synthesise and apply research findings, limited clinicians' uptake of best practices (Chiluba & Njapawu, 2019).

Concerning how often respondents' study professional literature on CVA/stroke rehabilitation, it was noted that a quarter of the respondent's study stroke-related literature every week while about half of the respondent study about once a month and more than a quarter reported that they rarely read stroke related literature. Umair et al. (2014) found

that less than quarter of the participants studied stroke-related literature frequently while a few rarely and more than three quarters of therapists reported that they never read stroke related literatures.

## 5. Discussion

The study results emphasize the need for continuing education of physiotherapists in stroke rehabilitation focusing on the efficacious treatments and implementation. Physiotherapists must not only rely on the treatment approaches that they were taught in their professional education but should be able to incorporate new physiotherapy approaches as new evidence becomes available.

In order to fully incorporate the new recommended evidence-based treatment approaches into clinical practice, training programs should be conducted to help physiotherapists acquire the clinical practical skills and knowledge required to implement these approaches in stroke rehabilitation. Furthermore, there is need to address the barriers among physiotherapists which affects the choice of stroke rehabilitation approach to achieve a better understanding and practice of stroke rehabilitation. The scope of practice that reflects the latest evidence base will improve the provision of services and will contribute to better and cost-effective physiotherapy interventions for stroke patients.

## 6. Declarations

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Our gratitude goes to the hospital managements and departments of physiotherapy at the University Teaching Hospital and Levy Mwanawasa University Teaching Hospital for allowing us to conduct this study. Our gratitude also goes to the physiotherapists who took part in this study.

### Competing interests

The author declare that they have no competing interests.

### Author contributions

All the authors conceptualized and participated in writing the manuscript, the data

was analyzed by MM and all authors approved the final manuscript submission.

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