








Original Article

Knowledge and practices toward occupational safety among workers in vibrated block industries: A cross-sectional study

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ABSTRACT

Objectives: Workers in block industries are exposed to significant occupational hazards and consequently are at high risk of work-related diseases. This study aimed to determine knowledge and practices toward occupational safety among workers in the Vibrated Block Industries in Calabar Municipality, Cross River State, Nigeria.

Material and Methods: A descriptive cross-sectional design was adopted using a semi-structured questionnaire to elicit information from 120 workers in 40 vibrated block industries. Data collected were analyzed using IBM Statistical Package for the Social Sciences Statistics version 25. Associations were tested using Chi-square statistics.

Results: The results indicate that 112 (94.1%) respondents were aware of occupational hazards associated with their job. The majority of the respondents 107 (89.9%) had a good knowledge level of occupational hazards and safety measures. The majority of the respondents 112 (94.1%) reported that personal protective equipment was available in their workstations. Only 54.6% had a good safety practice level. The majority of the respondents 83 (69.7%) knew that their job could pose an adverse effect on their health and 80 (67.2%) reported having experienced one or more health challenges associated with their work. A significant association was found between years of experience and level of safety practice ($P = 0.008$). The majority of the industries had never been inspected by regulatory agencies.

Conclusion: The study observes an overall good level of knowledge of occupational hazards but the level of safety practice is poor among block industry workers. Regular monitoring of workers by industry administrators and occasional monitoring of industries by relevant regulatory agencies to ensure adherence to safety measures are imperative.

Keywords: Knowledge, Safety practices, Occupational hazard, Vibrated block industry

INTRODUCTION

Rapid urbanization in Nigeria is accountable for a high demand for housing in cities. To meet these needs, new buildings are constructed largely by private developers with the use of concrete blocks for the super-structure. Small-scale block-making factories owned by private individuals are found in available spaces in cities to seize the existing market opportunity of supplying blocks to developers.^[1] The construction industry/work involves a lot of risks. The International Labor Organization (ILO) estimates at least 60,000 fatal accidents a year on construction sites around the world, that is, one in six of all fatal work-related accidents. The global trade union federation puts the figure much higher at 108,000 with construction responsible for 30% of all work-related

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accidents.^[2] In Britain, for example, a study report by the Health and Safety Executive (HSE)^[3] stated that the block industry accounts for 27% of fatal injuries to employees and 9% of reported major injuries. Workers in the block industries are exposed to significant occupational hazards and consequently at high risk of work-related diseases which vary from minor irritations or injuries to cancers.^[4] Citra *et al.*^[5] have reported physical, chemical, and biological hazards in the informal industry of paving blocks and concrete bricks, including respiratory tract infections, irritation, heat stroke, dehydration, and various forms of injury. Ezeonu *et al.*^[6] reported that the spectrum of produced injuries by various circumstances of mechanical insight in industries as well as their frequencies in Nigeria includes the following: Abrasion (scratch) 37.5%, contusions (bruises) 27.0%, incisions (cuts) 15%, penetration 6.5%, lacerations 0.8%, and fractures 0.2%. The ILO further estimates that workers suffer 270 million accidents and 33,500 fatalities or fatal injuries annually, whereas avoidable occupational diseases affect 160 million people every year.^[2] Occupational accidents are unplanned events that take place at a workplace and include slips, falls from height, hitting against an object, or being caught between machinery. These accidents are a result of unsafe acts, faulty equipment, or nature.^[7]

While providing a safe work environment for workers is the responsibility of employers, workers need to take responsibility for their safety and that of other workers by strictly adhering to laid down safety measures in their various work environments.^[8]

In spite of the various risks involved in the block-making industry including accidents, inhalation of toxic chemicals and cement dust, cement burns, etc., the occupational health and safety practices of workers in these industries are very poor. For instance, Citra *et al.*^[5] observed that all workers in an informal paving block and concrete brick industry lacked personal protective equipment (PPE). They further report that none of the workers wore a safety helmet and that an operator even wore a face cap which does not protect the skull from falling objects; they also wore sandals as footwear, rather than safety shoes. Workers also used a cloth dust mask to protect them from dust. None of the workers used goggles to protect their eyes from exposure to sand and cement dust. In addition, the production operators lacked gloves. Alemu *et al.*^[9] reported that the majority of the participants (41.19%) did not use PPE due to the unavailability of those PPE, followed by (21.3%) due to lack of orientation on PPE usage. Similarly, other participants' reason for not using PPE was because they were not comfortable with them.

There is difficulty in determining the extent of work-related illnesses and diseases because of the delayed period of most occupational diseases' onset on work in the block industry. HSE^[3] explains that some of the diseases do not emanate from the workers as quickly as expected. When the diseases

finally manifest, it is often difficult to trace the root causes of workers' past exposures. With an increase in occupational-related diseases, there is a need for greater focus on preventive activities. Adopting health promotional measures at the workplace is an important step toward providing a healthier workplace, especially in developing countries where such measures are commonly not well considered. Some safety measures for the vibrated block industry include wearing eye goggles, face masks, gloves, ear plugs, aprons, and air filters. In developing countries like Nigeria, most block industries are in the informal sector, and safety precautions are not strictly implemented. The main reasons could include a low level of education of workers, inadequate knowledge of health hazards, and unavailability of preventive measures. The current study thus assessed the knowledge and practices toward occupational safety among the vibrated block industry workers in Calabar municipality, Cross River State, Nigeria.

MATERIAL AND METHODS

Ethical approval

Institutional Review Board (IRB) permission was obtained for the study.

Study setting

Calabar Municipality was created in 1996 with headquarters located along Ndidem Usang Iso road, Calabar, adjacent to the Ika Ika Oqua ultra-modern market. The local government is bounded in the North by the Odupkani Local Government Area, in the East by Akpabuyo Local Government Area, and in the West by the Cross River and Atimbo Rivers. Calabar Municipality consists of a total of ten political wards. It occupies an area of 16,144 sq. km with a population of 179,392 as at the 2006 population census with 91,208 males and 88,184 females (National Population Commission Census, 2006). However, the projected population as of 2022 was 279,800. Some important economic places in the Calabar Municipality include the Margaret Ekpo International Airport, the free trade zone, the Tinapa business resort, and the United Cement Company among others. Calabar Municipality is predominantly inhabited by the quas, other inhabitants include, Efiks, Efuts, and other Nigerians from other different parts of the country as well as foreigners. The main occupation of the indigenes is subsistent farming, fishing, trading, and a few civil servants. Calabar municipality has a total of 52 registered vibrated block industries with <10 workers in each industry (Cross River State Ministry of Commerce and Industries).

Study design

A descriptive cross-sectional study design was adopted to determine the knowledge, awareness of occupational hazards,

and utilization of PPE among vibrated block industry workers in Calabar Municipality, Cross River State, Nigeria.

Study population

The study population included all workers in vibrated block industries in the study area.

Sample size determination

Using the Lutz formula^[10] and assuming an alpha level corresponding to the confidence level of 95%, that is, 1.96, a desired precision of 0.09, a non-response rate of 1%, and a prevalence of 50% representing occupational health hazards among vibrated block workers, a minimum sample size of 120 was arrived at.

Sampling procedure

A multistage sampling method was used to select 120 respondents for the study. First, a list of registered vibrated block industries in the study area was obtained from the Cross River State Ministry of Commerce and Industries. Each registered industry was assigned a number which was written on pieces of paper, folded, and put in a container and the balloting method was used to randomly select 40 industries for the study. Second, from each selected industry, three vibrated block workers were randomly selected making a total of 120 respondents.

Data collection/instrument

Data were collected using a structured questionnaire. The questions were read out to the respondents who were not able to read and their responses were recorded. Those who were able to read were allowed to fill out and return the questionnaire to the researchers subsequently. The questionnaire comprised six sections, namely; Section A: Socio-demographic characteristics, Section B: Awareness of occupational hazards, Section C: Knowledge of respondents on work hazards and safety measures, Section D: Safety practices, Section E: Self-reported health problems experienced by workers at vibrated block industries, and Section F: Perceived factors affecting utilization of PPE.

Before the commencement of data collection, ethical approval was obtained from the Ethics and Research Committee of the Public Health Department, University of Calabar. Verbal informed consent was also obtained from respondents who were assured of the confidentiality of their information and that the information was strictly meant for academic purposes.

Data analysis

At the end of the study, 119 questionnaires out of 200 were retrieved. Responses for knowledge were coded into scores

(Yes = 1 and No = 0) and summed for each respondent. Total scores were then categorized into poor knowledge (0–3) and good knowledge (4–6). Responses for safety practices were categorized as good and poor (Always = good) occasionally, when I feel it's necessary, and never = poor.

Data generated were analyzed using Microsoft Excel and Statistical Package for the Social Sciences version 25. Descriptive statistics was used to summarize the data. Chi-square was used to test the association between both educational level and years of experience with safety practices.

RESULTS

Socio-demographic data of respondents

The data from Table 1 reveal the socio-demographic characteristics of respondents who participated in this study. The result showed that most of the respondents 61 (51.3%) were between the age range of 25 and 40, followed by those between the age range of 20 and 24 (37.8%). Out of the 119 respondents who participated in this study, the majority

Table 1: Socio-demographic characteristics of respondents.

Variables	Frequency (n=119)	Percentage
Age		
20–24	45	37.8
25–40	61	51.3
41–50	11	9.2
Above 50	2	1.7
Sex		
Male	112	94.1
Female	7	5.9
Marital status		
Single	66	55.5
Married	48	40.3
Divorced	4	4.2
Religion		
Christianity	104	87.4
Islam	14	11.8
Other	1	0.8
Level of education		
No formal education	18	15.1
Primary	16	13.5
Secondary	73	61.3
Tertiary	12	10.1
Role at work		
Apprentice	2	1.7
Worker	110	92.4
Salesperson	2	1.7
Manager	5	4.2
Years of experience		
1–3 years	71	59.7
4–6 years	41	34.5
7–9 years	7	5.9
Above 9 years	0	0

112 (94.1%) were males whereas, 7 (5.9%) were females. This was attributed to the high level of physical labor needed as the nature of the job entails physical activities such as chiseling and breaking of blocks, heavy lifting, and the use of heavy vibrating machines. The majority of the respondents (87.4%) were Christians, (11.8%) were Muslims, and (0.8%) of the respondents were African traditional believers. More than half of the respondents 73 (61.3%) were secondary school leavers, followed by 16 (13.5%) of the respondents who had primary education, whereas 18 (15.1%) did not have any formal education. Most of the respondents 66 (55.5%) were single whereas, less than half of them 48 (40.3%) were married. The majority of the respondents 110 (92.4%) were workers, and only 4.2% of them were managers at these vibrated block industries. The findings showed that 71 respondents (59.7%) had spent at least 1–3 years working in these industries. Less than half of the respondents 41 (34.5%) have spent 4–6 years in service and 7 (5.9%) have spent 7–9 years.

Knowledge and awareness of respondents on work hazards and safety measures

The knowledge and awareness of respondents on work hazards and safety measures are shown in Table 2. The results

Table 2: Knowledge and awareness of respondents on work hazards and safety practices.

Variables	Frequency (n=119)	Percentage
Are you aware of the possible hazards associated with your work?		
Yes	112	94.1
No	7	5.9
If yes, how did you get to know about these hazards?		
Training	15	13.4
Administration	23	20.9
Colleagues	16	14.6
Personal experience	58	52.7
What are possible hazards associated with your work?		
Strain from lifting, back pain, and injury (skin)	68	53.1
Hearing impairment, eye injury, and cement burns	27	21.9
Chronic cough, difficulty in breathing, and skin irritation	33	25.0
Have you ever heard of PPE?		
Yes	112	94.1
No	7	5.9
Does PPE provide protection from injury?		
Yes	103	92.0
No	9	8.0

PPE: Personal protective equipment

indicated that the majority 112 (94.1%) of the respondents were aware of hazards within their workstations. More than half of the respondents 58 (52.7%), got their awareness through personal experience, followed by 23 (20.9%) of the respondents who got theirs through the administration, followed by 16 (14.6%) of the respondents who got theirs through their colleagues whereas 15 (13.4%) got their awareness through training. The respondents knew that strain from lifting, back pain and injury 68 (53.1%), chronic cough, difficulty in breathing and skin irritation 33 (25.0%), hearing impairment, eye injury, and cement burns 27 (21.9%) were some of the hazards associated with their job. The results showed that the majority of the respondents 112 (94.1%) had heard of PPE and had good knowledge about PPE. More than half of the respondents 103 (92.0%) knew that PPE provides protection.

As shown in Figure 1, the majority of the respondents had a good knowledge level of occupational hazards and safety practices.

Safety practices of workers in vibrated block industries

The findings are shown in Table 3 that most of the workers 112 (94.1%) admitted that PPE was available at their workstations. The available PPE as indicated by the respondents were: Boots 107 (46.1%), hand gloves 74 (31.9%), overalls 31 (14.2%), and helmets 13 (6.0%). According to the results, 60 (53.6%) of these PPE were provided by the company whereas, 52 (46.4%) were self-provided by the respondents. The majority of the respondents 112 (94.1%) used the PPE available at their workstations. The respondents who reported not using PPE stated that the unavailability of PPE (40.0%) was one of the major factors preventing their use. Furthermore, 32.0% of the respondents reported they felt uncomfortable using them whereas 28.0% of them said the PPE was not suitable for them. For those who utilized

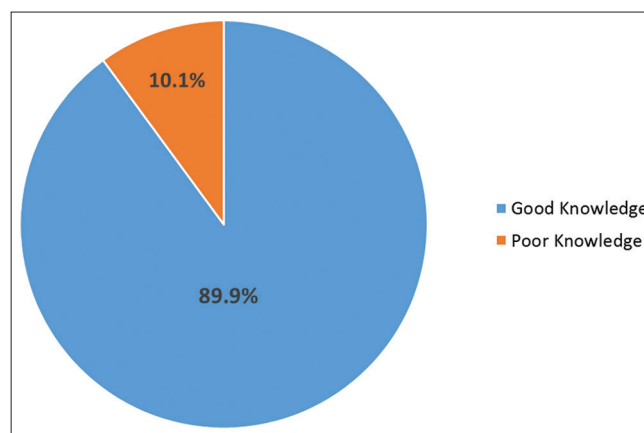


Figure 1: Pie chart showing the level of knowledge of workers on occupational hazards and safety measures.

Table 3: Safety practices of vibrated block industry workers.

Variables	Frequency (n=119)	Percentage
Are PPE available at your work site?		
Yes	112	98.21
No	7	1.79
What type of PPE is available?		
Overall	31	14.2
Face mask	4	1.8
Ear muffs	3	1.4
Boots	107	46.1
Helmet	13	6.0
Hand gloves	74	31.9
Who provides the PPE?		
Self	52	46.4
Company	60	53.6
Do you make use of the PPE at your workplace?		
Yes	112	94.1
No	7	5.9
If your answer above is No, what are your reasons		
Not comfortable using them	8	32.0
Not available	10	40.0
Not suitable	7	28.0
What type of PPE do you use regularly?		
Boot	55	49.1
Overall	19	17.0
Hand gloves	10	8.9
Helmet	6	5.4
Hand gloves and boot	14	12.5
Overall and boot	5	4.5
Hand gloves, overall, and boots	3	2.7
How often do you make use of PPE?		
Always	52	46.4
Occasionally	25	22.3
When remembered	8	7.1
When I feel it is necessary	27	24.1
Has any government/ non-government regulatory agency ever come to inspect your industry		
Yes	55	46.2
No	64	53.8

PPE: Personal protective equipment

PPE, the most frequently utilized PPE were boots 55 (49.1%). The majority of the respondents 52 (46.4%) always made use of their PPE, 25 (22.3%) made use of their PPE occasionally, 27 (24.1%) utilized them whenever they felt it was necessary, and 8 (7.1%) utilized them whenever they remembered. The majority 64 (53.8%) of the respondents reported that their industry had never been inspected by regulatory agencies.

As presented in Figure 2, the safety practice level of the workers was only averagely good.

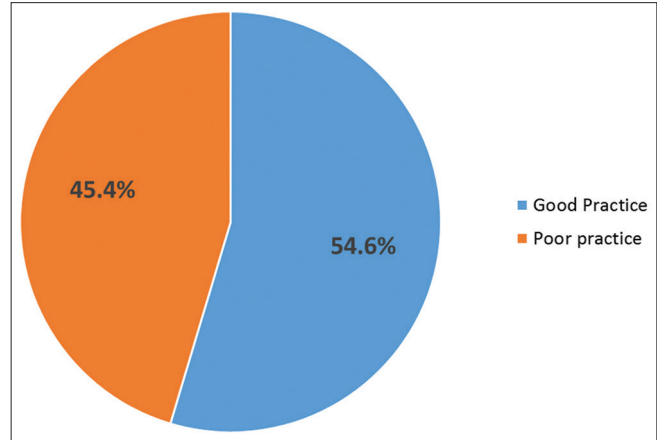


Figure 2: Pie chart showing safety practice level of vibrated block industry workers.

Self-reported health problems experienced by workers

The self-reported health problems experienced by workers are shown in Table 4. The majority of the respondents 83 (69.7%) asserted that they were aware that their jobs posed health challenges to them, and 80 (67.2%) of them had personally experienced one or more health challenges while working at these vibrated block industries. About 45 (37.0%) of the respondents had undergone medical examination before employment. Fifty-five (46.2%) of the respondents visit the hospital for treatment whereas 64 (53.8%) of them visit the pharmacy. More than half of the workers 68 (57.1%) pay for their medical bills, whereas 51 (42.9%) of the respondents said the company handles the bills.

As shown in Figure 3, the most frequently experienced health risks were skin irritation 90 (43.7%), followed by body pain, injury, catarrh, pneumoconiosis, hearing loss, and eye defects.

Association between selected socio-demographic variables of vibrated block industry workers with safety practices

As shown in Table 5, the test of association between safety practices and the level of education of respondents showed that good hygiene practice was more prevalent among respondents with secondary education compared with other educational levels. This difference was not statistically significant ($P = 0.07$). The proportion of respondents who had good safety practices was highest among those who were within their 1–3 years in the vibrated block industry followed by 4–6 years compared with those who had spent more years and the difference was statistically significant ($P = 0.008$).

DISCUSSION

The study reveals that the majority of the respondents were aware of hazards within their workstations. The majority

also had good knowledge of the forms of hazards associated with their work and the necessary safety measures. This good knowledge level, however, did not fully translate to actual safety practices in the workplace as only a little above half of the workers had good safety practice levels. Citra *et al.* [5] also observed poor safety practices among all workers in an

informal paving block and concrete brick industry despite the level of knowledge. Kekana^[7] observed poor safety practices in a brick manufacturing industry in the Polokwane Municipality, Limpopo Province of South Africa. Magoro^[11] also reported that the majority of his study respondents had good knowledge about work hazards and safety measures but reported low PPE use among the workers. Ezeonu *et al.*,^[6] in their study on occupational health hazards among Nigerian cement workers, revealed that virtually all of their respondents were aware of the manifest health hazards. On the contrary, Jonathan *et al.*^[12] reports low awareness of workers in construction industries on safety measures. Ford and Tetrick^[13] reported a generally low level of awareness of occupational hazards among industry workers.

According to the study findings, the main sources of information on occupational hazards were personal experience and the industry administration. Inadequate information on safety practices results in poor practices.

Table 4: Self-reported health problems experienced by workers at vibrated block industries.

Variables	Frequency (n=119)	Percentage
Do you think your job causes health problems/challenges?		
Yes	83	69.7
No	36	30.3
Have you ever experienced any health problem you think is work-related?		
Yes	80	67.2
No	39	32.8
What are the health problems experienced?		
Catarrh	25	12.1
Pneumoconiosis	8	3.9
Hearing loss	8	3.9
Skin irritation/disease	90	43.7
Body pain	46	22.3
Injury	25	12.1
Eye defect	4	1.9
Did you undergo medical examination before employment?		
Yes	45	37.8
No	74	62.2
Where do you take your treatment when you fall sick?		
Hospital	55	46.2
Pharmacy	64	53.8
Who pays for the cost of treatment?		
Myself	68	57.1
Company	51	42.9

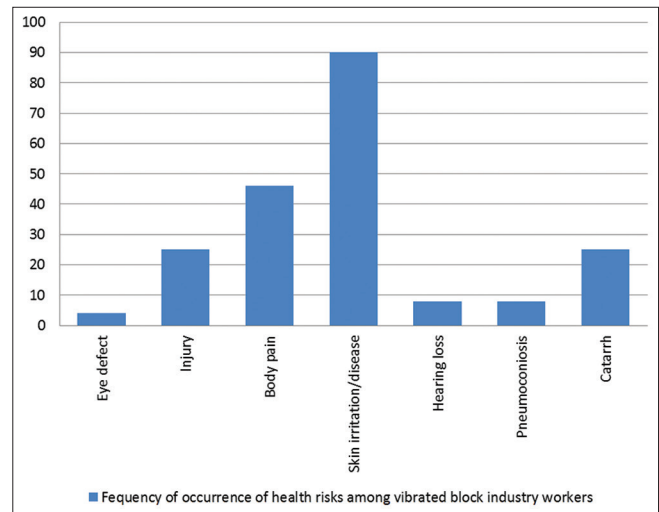


Figure 3: Self-reported health problems experienced by workers at vibrated block industries.

Table 5: Association between selected socio-demographic variables of vibrated block industry workers with safety practices.

Variables	Safety practice level		df	Chi-square (χ^2)	P-value
	Good practice n(%)	Poor practice n(%)			
Educational level			3	10.317	0.0683
No formal	11 (11.1)	7 (35.0)			
Primary	13 (13.1)	3 (15.0)			
Secondary	65 (65.7)	8 (40.0)			
Tertiary	10 (10.1)	2 (10.0)			
Years spent in the vibrated block industry			3	8.879	0.008
1-3 years	54 (56.8)	17 (70.8)			
4-6 years	36 (37.9)	5 (20.8)			
7-9 years	5 (5.3)	2 (8.4)			
Above 9 years	0 (0.0)	0 (0.0)			

df: Degrees of freedom

Access to information on safety measures is likely to minimize workplace injuries as posited by Anosike and Ayeade,^[14] who carried out a similar study among workers in a cement factory in Nigeria. This study finding also supports the report of Jonathan *et al.*,^[12] where personal effort and job training were the main sources of awareness of occupational hazards and safety.

From the study findings, the most recognized hazards were strain from lifting, back pain, and injury, followed by chronic cough, difficulty breathing, skin irritation, hearing impairment, and cement burns.

The study results showed that the majority of the respondents had used one or more PPE at their workstations. Half of the respondents regularly made use of their PPE at their workstations and the majority of the respondents knew that PPE provides protection from hazards. In addition, most of the respondents agreed that their jobs involved some occupational hazards and health problems but were not consistent in the application of safety measures. Reasons given for the non-use of PPE by some of the respondents were unavailability and discomfort. Musa *et al.*,^[15] in their study, also reported that the reasons for non-use of PPE among some workers were discomfort, suitability, difficulty in using without assistance, and the high cost of equipment in the market. The utilization of PPE among workers is imperative for the reduction of occupational hazards, injuries, and accidents sustained in the work environment. The observation is that most of these industries are not monitored by relevant regulatory agencies and the absence of safety training may be responsible for the inconsistency in safety practices.

Most of the workers had experienced one form of health problem or another associated with their work. This agrees with the findings of Ahmed *et al.*^[16] and Citra *et al.*,^[5] where the majority of the workers interviewed reported several health problems associated with their job. The major health problems experienced were skin irritation, body pain, and injury. Musa *et al.*^[15] reported that most of the workers in their study reported respiratory impairment and noise pollution as their major health challenges.

In the present study, most respondents reported not having had any pre-employment medical examination. This finding is in agreement with the report of Musa *et al.*,^[15] where the majority of the workers had not undergone periodic or pre-employment medical examinations. This attitude is against the early detection of diseases.^[17] The present study showed a significant association between years spent in the block industry and safety practices. However, the level of good safety practices declined with a prolonged stay in the block industry. The relapse may be because there is no monitoring of the workplace and regular safety training. There is a need for monitoring by industry administrators and regulatory

agencies to ensure adherence to safety measures and the promotion of occupational health and safety. This study, however, is not without limitations as the sample size used for the study may limit the generalization of the present data. Second, the use of self-reported data from respondents may underestimate or overestimate the number of cases of occupational hazards in the block industry.

CONCLUSION

The study concludes that the level of knowledge and awareness of occupational hazards and necessary safety measures are high but do not translate to safety practices. Because of these findings, employers should adequately educate their employees on the specific hazards associated with their jobs and the need to adopt safety measures to guard against health risks. There should be regular monitoring of workplaces by relevant regulatory agencies to ensure compliance with safety standards.

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Ethical approval

The research/study complied with the Helsinki Declaration of 1964.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

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Nil.

Conflicts of interest

There are no conflicts of interest.

Use of artificial intelligence (AI)-assisted technology for manuscript preparation

The authors confirm that there was no use of artificial intelligence (AI)-assisted technology for assisting in the writing or editing of the manuscript and no images were manipulated using AI.

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