Research

Evaluation of Musculoskeletal pain, Health and Safety measures among workers at construction sites in Port Harcourt, Nigeria

[1,2]Friday E. Aaron, [3]Anelechi K. Madume, [1,2]Rex Friday O.A. Ijah

[1]Department of Surgery, Rivers State University (RSU), Port Harcourt, Nigeria.
[2]Department of Surgery, Rivers State University Teaching Hospital (RSUTH), Port Harcourt, Nigeria.
[3]Department of Physical Therapy, Rivers State University Teaching Hospital (RSUTH), Port Harcourt, Nigeria.

Corresponding author: Rex Friday Ogoronte A. Ijah*; rexijah@gmail.com; +2348033953290*

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Abstract

Background: Musculoskeletal disorders constitute a major health challenge for construction workers and the general population. The study evaluated musculoskeletal pain, health and safety measures among workers at construction sites in the Rivers State University Teaching Hospital, and two of the flyover bridges sites in the last quarter of 2021.

Methods: A descriptive cross-sectional study was carried out among workers at construction sites in the Rivers State University Teaching Hospital and two flyover-bridges in Port Harcourt Nigeria. Questionnaire was used to obtain data that was analyzed with the Statistical Package for the Social Sciences (SPSS) version 20.0.

Results: A total of seventy-five (75) respondents were involved I n the study. More than half (50%) of respondents had pain at the neck, shoulder, waist, and wrist/fingers not allowing them to hold objects firmly. Twenty-nine (38.7%) respondents had undergone training for safety measures before start of work at the construction site. Sixty-three (84.0%) had worked in awkward positions at site. Forty-one (54.7%) respondents opined that PPEs were not provided, and 47 (62.7%) did not use PPEs at work. Complaints of injury was often taken seriously at some construction sites as declared by 32 (42.7%) respondents; however, 20 (26.7%) respondents had a contrary opinion.

Conclusion: Musculoskeletal pain is a common problem affecting most construction site workers following workplace tasks or injuries sustained. There was no uniformity in training and conduct on health and safety issues. There is need for a regulatory framework to ensure compliance with health and safety measures at construction sites.

Keywords: Musculoskeletal Pain, Health & Safety Measures, Construction Workers, Port Harcourt, Nigeria.

Introduction

The International Association for the Study of Pain define pain as an unpleasant sensory and emotional experience associated with actual or potential tissue damage[1]. Pain is a major symptom in many medical conditions, and can significantly interfere with a person's quality of life and general functioning. Musculoskeletal pain (MSP) is a common cause of severe long-term pain, and physical disability arising from work-related task affect the nerves, tendons, muscles, and supporting structures[2]. It is a global problem affecting all spheres of human endeavours, with an enormous consequential economic drain in many developing and developed countries[3]. The economic burden was described to be second only to that of cardiovascular disease. In the United States of America, the overall cost of MSP was estimated to be about 214.9 billion US Dollars and the direct costs of managing MSP that was work-related amounted to 88.7 billion US Dollars, of which 38% was spent on hospital admission and 21% on nursing home care.[3]

Construction industry is known as one of the world's major industrial sectors, which include sub-sectors such as building, civil engineering, demolition and maintenance. Construction industry is rapidly growing in different developing countries and thus recognized as a main source for providing jobs to different labours. It is expected that spendings in construction sector will be up to 14 Trillion (US $) in 2025, which was only 9.5 Trillion (US $) in 2014, representing a growth of 47%[4]. Over the last decade, several changes have occurred in Nigeria,

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which have helped all sectors of the economy, especially the building and construction sector. With double digit growth rates in the last 3 years, the construction industry has outgrown all other sectors of the Nigerian economy[5]. Construction industry is recognized as one of the risky industries. The construction workers' job may include variety of task while they are working in different projects. Different causes of accidents and illness in construction industry are known and thus can be prevented[6, 7].

Musculoskeletal disorders constitute a major health challenge for construction workers and the general population. Experiences from our general out-patient clinics revealed that construction-site worker present with myriads of challenges, some of which get referred to the orthopedic / surgical department. Compelling evidence shows that the construction industry provides an environment that increases the vulnerability of workers to sustaining work-related musculoskeletal diseases. A number of factors influencing safety performance in the construction industry were identified which include worker's attitudes, construction company size, safety policy and training, project coordination, and economic pressure. It has been reported that in developing countries, laws meant to protect workers from construction site accidents may not be enforced strictly by contractors[8] and the workers themselves tend to ignore basic safety rules and regulations which are meant to protect them from getting involved in accidents. The study therefore aims to evaluate work-related musculoskeletal pain, health and safety measures among workers at construction sites in the Rivers State University Teaching Hospital, and two of the flyover bridges sites (Oro-gbum and Oro-Ochiri) in the last quarter (October to December) of year 2021.

Method

Study Area: The study was carried out in Port Harcourt, the capital of Rivers State. Rivers State is a petroleum oil producing State located in the Southern part of the Federal Republic of Nigeria, with many multinational oil companies. Port Harcourt is a city that witnessed the occurrence of construction works going on in several sectors including the Rivers State University Teaching Hospital, a State-owned tertiary healthcare facility in Port Harcourt.

Study Sites: The study site / setting was the construction sites at the Rivers State University Teaching Hospital, and two flyover bridges / sites (Oro-gbum and Oro-Ochiri) in Port Harcourt.

Research Design: A descriptive cross-sectional study

Study Population: Construction workers at stated construction sites, who gave consent, constituted the study population.

Bias: Workers at construction sites who were not present during data collection, who were not directly involved in construction work, or who declined consent were included.

Study Instrument: A study proforma (questionnaire) was developed for data collection.

Study Variables: Socio-demographic data; complaints/symptoms at work (number and percentage); health and safety measures available at construction sites; symptom alleviation measures for workers at construction sites; and injuries at work (impact of work environment on workers), were the variables that were studied.

Data Analysis: Data obtained was analysed using the Statistical Package for the Social Sciences (SPSS) version 20.0 (presented as numbers, percentages and Chi-Square).

Validity/Reliability of Instrument: The study data was scrutinized by all the authors for authenticity or otherwise, and pre-tested before use (Cronbach alpha test = 0.715).

Results

A total of seventy-five (75) respondents were involved in the study, and 97.0% questionnaire retrieval was achieved.

Table 1: Socio-demographic characteristics of respondents (n = 75)

Variables	Number	Percent
Sex		
Male	75	100.0
Female	0	0.0
Age (Mean = 32.11±8.15; Min = 18, Max=59)		
18 - 30 years	35	46.7
31 - 40 years	30	40.0

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Variables	Number	Percent
41 - 50 years	7	9.3
51 - 60 years	3	4.0
Marital Status		
Single	35	46.7
Married	39	52.0
Separated/Divorced	1	1.3
Educational qualification		
First School Leaving Certificate	7	9.3
Junior Secondary	4	5.3
Senior Secondary Education	58	77.3
Tertiary Education	6	8.1
Religion		
Christianity	55	73.3
Islam	20	26.7
Type of Work		
Engineer	5	6.7
Electrician	1	1.3
Welder/iron bender	5	6.7
Mason	21	28.0
Bricklayer	25	33.3
Others	18	24.0
Years of Experience		
Less than 1 year	10	13.3
1-2 years	16	21.3
3-4 years	14	18.7
5-6 years	14	18.7
7-8 years	11	14.7
9-10 years	3	4.0
More than 10 years	7	9.3
Nationality		
Nigerian	74	98.7
African	1	1.3

Table 1 shows the socio-demographic characteristics of respondents. All the respondents were male. The youngest was 18 years old and oldest was 59 years old. The mean age of the respondents was 32.11±8.15 years. The majority of the respondents were between the age of 18 and 40 years. Only 4.0% were between ages 51 and 60 years. Thirty-nine (52.0%) were married and 35 (46.7%) were single. Fifty-eight (77.3%) respondents had senior secondary education and 55 (73.3%) were Christians. Twenty-five (33.3%) were bricklayer, 21 (28.0%) were skilful in masonry and 5 (6.7%) were welders. Their years of experience in this series of trades varies from less than 1 year to more than 10 years. They were all Africans and 74 (98.7%) were Nigerians.

Table 2: Evaluation of Complaints/Symptoms at Work (n = 75)

Variables	Yes		No		Not Sure		No response	
	Number	(%)	Number	(%)	Number	(%)	Number	(%)
Experience pain at the neck	38	50.7	37	49.3	0	0.0	0	0.0
Pain at the neck allow one to turn right and left	28	37.3	18	24.0	3	4.0	26	34.7
Experience pain at the shoulder	40	53.3	35	46.7	0	0.0	0	0.0
Pain at the shoulder allow you to raise your hand all up	35	46.7	13	17.3	1	1.3	26	34.7
Experience pain at the elbow	27	36.0	48	64.0	0	0.0	0	0.0
Experience pain at the wrist	30	40.0	19	25.3	26	34.7	0	0.0
The pain at the wrist/fingers not allowing hold objects firmly	52	69.3	10	13.3	0	0.0	13	17.3
Can do repetitive movements with hand for at least 3 hours (Low Back Pain)	27	36.0	15	20.0	0	0.0	33	44.0
Experience pain at the waist from time to time (Low Back Pain)	51	68.0	20	26.7	4	5.3	0	0.0

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Variables	Yes		No		Not Sure		No response	
	Number	(%)	Number	(%)	Number	(%)	Number	(%)
Waist pain allow you to bend over (Low Back Pain)	49	65.3	4	5.3	3	4.0	19	25.3
Experience pain at waist/hip joint? (Low Back Pain)	36	48.0	31	41.3	0	0.0	8	10.7
Can stand for more than 3 hours every day?	69	92.0	3	4.0	2	2.7	1	1.3
Experience pain at knee joint	31	41.3	37	49.3	0	0.0	7	9.3
Experience pain at ankle joint	28	37.3	41	54.7	1	1.3	5	6.7
Experience pain at thigh region	31	41.3	39	52.0	0	0.0	5	6.7
Experience pain at lower leg	30	40.0	40	53.3	0	0.0	5	6.7
Pain interrupt daily activities	11	14.7	53	70.7	5	6.7	6	8.0

The evaluation of complaints/symptoms at work is presented in Table 2. More than half (50%) of respondents had pain at the neck, shoulder, waist, and wrist/fingers not allowing them to hold objects firmly. Thirty-one (41.3%), 28 (37.3%), 31 (41.3%) and 30 (40.0%) respondents experienced pain at knee joint, ankle joint, thigh region and at lower leg among the respondents was respectively. Some 14.7% of the respondents affirmed that pain that they experienced interfered with their daily activities. Sixty-nine (92.0%) respondents affirmed that they could stand for more than 3 hours every day.

Table 3: Evaluation of Health and Safety Measures at Construction Sites (n = 75)

Variables	Yes		No		Not Sure		No response	
	Freq	(%)	Freq	(%)	Freq	(%)	Freq	(%)
Undergo training program for safety measures before start of work at the construction site	29	38.7	45	60.0	1	1.3	0	0.0
The training program help in anyway	28	37.3	8	10.7	2	2.7	37	49.3
Taught safety precautions at workplace	30	40.0	40	53.3	0	0.0	5	6.7
Do help team mates to understand the importance of health and safety at work	32	42.7	27	36.0	2	2.7	14	18.7
Do work in awkward position (bend, twist, heavy manual labour) at work	63	84.0	11	14.7	1	1.3	0	0.0
Do work with chemicals or inflammable substances	13	17.3	61	81.3	1	1.3	0	0.0
Do work at height of more than 3-4 meters	69	92.0	5	6.7	1	1.3	0	0.0
Manually push or lift items/weights more than 20kg	62	82.7	13	17.3	0	0.0	0	0.0
Do perform tasks that you are not familiar with	24	32.0	48	64.0	3	4.0	0	0.0
Do get breaks in-between work	60	80.0	15	20.0	0	0.0	0	0.0

Table 3 show some health and safety measures, and some risk factors for injury at construction sites. Twenty-nine (38.7%) respondents had undergone training for safety measures before start of work at the construction site. Only 28 (37.3%) of respondents considered the training program they had to be beneficial. Sixty-three (84.0%) had worked in awkward positions at site. Thirty (40.0%) were taught safety precautions at workplace. Sixty-two (82.7%) respondents manually push or lift items/weights more than 20kg, and 69 (92.0%) worked at height of more than 3-4 meters. Twenty-four (32.0%) had performed tasks that they were not familiar with.

Table 4: Evaluation of Health and Safety Measures at Construction Sites Cont'd (n = 75)

Variables	Number	Percent

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Time spent during break		
< 15 minutes	3	4.0
15-29 minutes	16	21.3
30-44 minutes	2	2.7
45-59 minutes	33	44.0
> 60 minutes	7	9.3
No response	14	18.7
How tasking work used to be daily		
Not tasking	14	18.7
Tasking	41	54.7
Very tasking	20	26.7
Love the job		
Yes	24	32.0
No	13	17.3
I am managing it	38	50.7
Suffering from any medical conditions		
Diabetes mellitus	1	1.3
Peptic ulcer	2	2.7
Others	16	21.3
No response	56	74.7
Provided with Personal Protective Equipment (PPE) to promote safety in the workplace		
Yes	34	45.3
No	41	54.7
Personal Protective Equipment (PPE) Provided		
Goggle	2	2.7
Helmet	14	18.7
Safety hand gloves	8	10.7
Safety vest	2	2.7
Safety boots	8	10.7
No PPE	41	54.7
Make Use of PPE Provided		
Yes	28	37.3
No	6	8.0
No PPE provided	41	54.7

Table 4 shows tasks at work, co-morbidities, provision and use of personal protective equipment. Workers had less than 1 hour break from resumption of duty to close of daily work with a maximum break time of 45-59 minutes as opined by 33 (44.0%) respondents. Forty-one (54.7%) respondents considered their work as tasking, while it was very tasking for 20 (26.7%). Three (4.0%) respondents had co-morbidities. Forty-one (54.7%) respondents opined that PPEs were not provided, and 47 (62.7%) did not use PPEs at work.

Table 5: Attitude to Injuries at Construction Sites Cont'd (n = 75)

Variables	**Number**	**Percent**
Are there efforts to identify and deal with hazards in the workplace?		
Yes	38	50.7
No	32	42.7
Not sure	5	6.6
Are complaints of injury is often taken seriously?		
Yes	32	42.7
No	20	26.7
Sometimes	23	30.6
Do you refuse to work if environment is not safe until it is made safe?		
Yes	21	28.0
No	50	66.7
Sometimes	4	5.3
When injury occurs at work, there is provision for immediate medical attention?		
Yes	39	52.0
No	23	30.7
Not sure	13	17.3
Availability of immediate medical attention		
Use First Aid box	34	45.3

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Take victim for doctors to see	4	5.3
Take victim to chemist/pharmacy	12	16.0
Take victim to a nurse to care for	2	2.7
Take victim for traditional massage or herbal therapy\	1	1.3
No response	22	29.3

Table 5 shows attitude of construction companies to injuries sustained by workers at construction sites. Thirty-eight (50.7%) respondents opined that there were efforts in place to identify and deal with hazards in the workplace, while 32 (42.7%) felt otherwise. Complaints of injury is often taken seriously at some construction sites as declared by 32 (42.7%) respondents; however, 20 (26.7%) respondents had a contrary opinion. Fifty (66.7%) respondents kept on working even in unsafe environment. Thirty-nine (52.0%) workers affirmed that immediate medical attention was available for injuries that occur at construction site, while 23 (30.7%) asserted in the negative. Available immediate medical attention was: use first Aid box at site (34 = 45.3%); take victim for doctors to see (4 = 5.3%); Take victim to chemist/pharmacy (12 = 16.0%); take victim to a nurse to care for (2 = 2.7%); etc.

Table 6: Symptom alleviation measures for workers at construction site (n = 75)

Variables	Number	Percent
What was done for the pain (any treatment) experiencing		
I have seen a doctor	1	1.3
Bought medications prescribed for me	5	6.7
Have been taking pain killers	30	40.0
Been taking mixed medications from chemist/pharmacy shop	18	24.0
I have gone for traditional massage	2	2.7
I have done nothing	10	13.3
No response	9	12.0
Types of painkillers taken		
Paracetamol	30	40.0
Diclofenac/Brufen / Feldene	9	12.0
Tramadol/Tramal	1	1.3
Others	10	13.3
I don't know	10	13.3
None	15	20.0
Duration of time taking painkillers		
1 - 3 months	25	33.3
4 - 6 months	15	20.0
7 - 12 months	5	6.7
13 - 24 months	3	4.0
More than 2 years	2	2.7
No response	25	33.3

Symptom alleviation measures for workers at construction site is presented in Table 6. Thirty (40.0%) respondents used pain killers to alleviate the pain, while 18 (24.0%) used mixed medications from chemist/pharmacy shops. Drugs used for pain alleviation included paracetamol (30 = 40.0%), diclofenac/brufen/feldene (9 = 12.0%), etc. Twenty-five (33.3%) respondents had been regularly taking painkillers for 1 to 3 months, 15 (20.0%) for 4 to 6 months and 5 (6.7%) for more 7 -12 months.

Table 7: Injury sustained at work - Impact of work environment on workers (n =75)

Variables	Number	Percent
Ever experienced any injury at workplace		
Yes	38	50.7
No	36	48.0
Not sure	1	1.3
Location on the site where injury occurs		
Foundation	4	5.3
Ground floor	7	9.3
First floor	8	10.7
Second floor	9	12.0
Third floor	4	5.3
At surrounding site	7	9.3
No injury	36	48.0
What led to the injury		
Unsafe work tools	20	26.7
Carelessness	10	13.3
Can't remember	9	12.0
No Injury	36	48.0
Severity of the injury		
Mild	9	12.0
Moderate	24	32.0
Severe	6	8.0
No Injury	36	48.0
Did the injury sustained disrupt work for a period?		
Yes	19	25.3

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Variables	Number	Percent
No	16	21.3
Not sure	4	5.3
No Injury	36	48.0
Period the injury interferes with work		
Less than 1 week	5	6.7
1 week	11	14.7
2-4 weeks	3	4.0
None/No injury	56	74.7
Able to work like before after recovery from the injury		
Yes	31	41.3
No	1	1.3
Not sure	7	9.3
No Injury	36	48.0

In Table 7 shows the injury sustained at work, causes, and their impact on workers. Thirty-eight (50.7%) respondents had experienced injury at workplace. Nine (12.0%) had injury on second floor, 8 (10.7%) on first floor, 7 (9.3%) at ground floor, and 36 (48.0%) had no injury. Unsafe work tools accounted for cause of injury in 20 (26.7%) respondents, and carelessness in 10 (13.3%) respondents. The magnitude of the injury among the respondents was mild in 9 (12.0%), moderate in 24 (32.0%), and severe in 6 (8.0%) respondents. The injury sustained disrupted work for a period in 19 (25.3%) respondents. Eleven (14.7%) respondents opined that the injury sustained interfered with their work for a period of a week, while in 5 (6.7%) respondents it was for less than a week. After recovery from injury, 31 (41.3%) respondents were unable to work as much as the way they did before the injury.

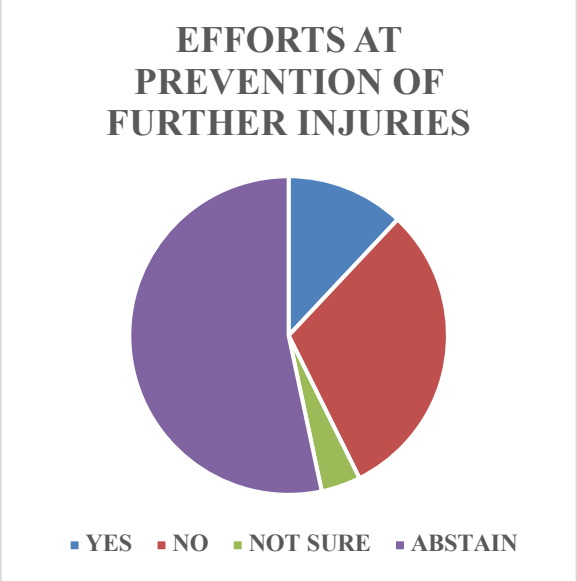

Figure 1: Showing opinion on company efforts at prevention of further injuries at work

Figure 1 shows effort made to prevent further occurrence of injury at construction site. Twenty-three (30.7%) respondents believed no effort was made to prevent further occurrence of injuries at work, while 40 (53.3%) choose to abstain from the inquest.

Table 8: Relationship between episode of neck pain and age of respondents (n = 75)

Age (Years)	Experience neck pain Yes	No	Total	**(X^2)**
18 - 30	16 (45.7%)	19 (54.3%)	35	
31 - 40	16 (53.3%)	14 (46.7%)	30	**0.853**
41 - 50	4 (57.1%)	3 (42.9%)	7	
51 - 60	2 (66.7%)	1 (33.3%)	3	
Total	38	37	75	

Discussion

The respondents had a mean age of 32.11±8.15 years and were all males. More than half were married, with at least a secondary education. There were different skilled and semi-skilled workers as expected in a construction site. Almost all were Nigerians. More than half of the construction site workers had sustained and reported varying degree of injury or the other, and unsafe work tools and carelessness on the side of the workers were the most common reasons for injuries. Our study findings agree with a similar study done in Malaysia

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detailing causes of accidents at construction sites[9]. In Abuja Nigeria, negligence was reported as the main reason for accidents at construction sites[10]. A similar study in Enugu Nigeria reported failure to use personal protective equipment, faulty/defective equipment and the use of sub-standard construction materials as the most common cause of accidents at construction sites[11]. In a Ghanaian study, "inadequate equipment and tools, lack of health and safety training among stakeholders; lack of appropriate skills; bad attitude towards work, and poor working conditions and environment" were listed as factors identified as causes of accidents[12].

Joint pain was the most common symptom among the workers at the construction sites, which interfered with their daily activities. Our study is similar to findings in a Nigerian systematic review that revealed lumbar, knee, shoulder, and wrist musculoskeletal symptoms as being most prevalent among construction workers[13]. In Iowa, a study among apprentice construction workers revealed that low back pain was the most common musculoskeletal disorder[14]. Also, another study carried out in construction sites in China reported musculoskeletal pain among 41% of the participants[15]. In our study, some of these injuries had disrupted their work, and affected their productivity. This is impactful both for the company and the workers, implying a need for mutual effort to ensure that the injuries do not occur. Our study agrees with the findings of another study in Akwa-Ibom State in Nigeria, in which the sustained injuries not only affect productivity, but also negatively affect the public image of the company involved[16]. There is no statistically significant relationship between episodes of neck pain experienced and the age of the worker.

Workers at construction sites use painkillers for prolonged period, and the most used drug was paracetamol, followed by the non-steroidal anti-inflammatory drugs. There are challenges associated with prolonged use of some of these drugs: none-steroidal anti-inflammatory drugs and chronic renal disease[17, 18], none-steroidal anti-inflammatory drugs and gastrointestinal bleeding or perforation[19], etc. The mode of care of victims of injuries is also varied. It is worrisome that some victims were treated independently by a nurse, pharmacist, herbalist, or a doctor, without formal construction company policy for the victims.

While no effort was made to forestall further injuries as reported by a third of respondents, most of the others elected not to comment on the issue. This observation may be because there is no statutory control or regulation of the activities of the construction companies as it affects health and safety issues. Similar observation of a lack of attention to these issues had been reported in a study in Akwa Ibom Nigeria[16]. Only about a third of respondents had undergone training for safety measures before start of work at the construction site, and less than half were taught health and safety measures at work site. More than two-third respondents worked in awkward positions at construction site, and about a third had been involved in lifting or pushing weights and working at heights. These conditions at work were worrisome with most work tasking, and limited period for a break per day, even with comorbidities among some workers. Even without PPE usage workers continue to work.

There was some divergence of opinion on injury-preventive measures at workplace, as most respondents asserted in the negative while others indicated otherwise. Also, complaints of injury at site were said not to be taken seriously by some. Immediate medical care for injured victims was also not consistently reported by respondents as first aid box for instance, was not available at site for most of the workers.

***Study Limitations*:** Respondents from many construction sites participated in the study. These companies probably have different policies for workers, hence the divergence in some opinions.

Conclusion

Musculoskeletal pain is a common problem affecting most construction site workers following workplace tasks or injuries sustained. We observed prolonged use of painkillers among the workers much of which is from self-medication. There appear to be poor knowledge or poor implementation of workplace policy or conditions of service guiding the engagement of these workers at all the construction sites. There was also no uniformity in training and conduct on health and safety issues. A regulatory framework should be put in place to ensure that Nigerians and others alike are less exposed to the consequences of breaches in health and safety issues at construction sites. This will go a long way to ensure strict enforcement of health and safety rules at construction sites.

Ethical Considerations: The approval of the Research Ethics Committee of the Rivers State University

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Teaching Hospital will be sought and obtained in writing, and confidentiality of information will be maintained in the process of data collection. This study will involve collection of blood sample from the individual patients.

Authors Contributions

Concept: Friday Enwumelu Aaron, Anelechi Kenneth Madume, Rex Friday Ogoronte A. Ijah
Design: Friday Enwumelu Aaron, Anelechi Kenneth Madume, Rex Friday Ogoronte A. Ijah
Definition of Intellectual Content: Anelechi Kenneth Madume, Rex Friday Ogoronte A. Ijah
Literature Search: Anelechi Kenneth Madume, Rex Friday Ogoronte A. Ijah
Clinical Studies: Friday Enwumelu Aaron, Anelechi Kenneth Madume, Rex Friday Ogoronte A. Ijah
Data Acquisition: Anelechi Kenneth Madume
Data Analysis: Friday Enwumelu Aaron, Anelechi Kenneth Madume, Rex Friday Ogoronte A. Ijah
Statistical Analysis: Adeyanju Z. Ope
Manuscript Preparation: Rex Friday Ogoronte A. Ijah
Manuscript Editing: Friday Enwumelu Aaron, Anelechi Kenneth Madume, Rex Friday Ogoronte A. Ijah
Manuscript Review: Friday Enwumelu Aaron, Anelechi Kenneth Madume, Rex Friday Ogoronte A. Ijah
Guarantor: Rex Friday Ogoronte A. Ijah

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Conflict of Interest: None declared

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