Sumerianz Journal of Medical and Healthcare, 2024, Vol. 7, No. 1, pp. 9-18
ISSN(e): 2663-421X, ISSN(p): 2706-8404
Website: https://www.sumerianz.com
DOI: https://doi.org/10.47752/sjmh.71.9.18

Original Article Open Access

Evaluation of the Factors Influencing Needle stick Injury And Bloodborne Pathogens among Healthcare Workers in Benue State University Teaching Hospital Makurdi, North-Central Nigeria

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Article History

Received: 5 January, 2024

Revised: 18 March, 2024

Accepted: 25 March, 2024

Published: 29 March, 2024

How to Cite

Onah Emmanuel Sunday, Ani Celestine Okafor and Anikpo Eberechukwu Florentina, *et.al.* (2024). "Evaluation of the Factors Influencing Needle stick Injury And Bloodborne Pathogens among Healthcare Workers in Benue State University Teaching Hospital Makurdi, North-Central Nigeria". *Sumerianz Journal of Medical and Healthcare*, Vol. 7, No. 1, pp. 9-18.

Abstract

It is well recognized that the danger of needle stick injuries and the blood-borne diseases they can cause is higher for healthcare professionals. In order to do this, a survey on the variables influencing blood-borne infections and needle stick injuries among medical personnel at the Benue State University Teaching Hospital (BSUTH) in Benue State, North Central Nigeria, was carried out. A descriptive cross-sectional survey was used as the methodology, and questionnaires

were given to medical professionals at BSUTH in Makurdi, Benue State, including doctors, nurses, and medical laboratory scientists. Using a straightforward random sample method, the participants who fulfilled the inclusion requirements were chosen. Findings: The questionnaires were distributed to participants between the ages of 20 and 35. Of those, 190 (68.8%) were female, and 177 (64.10%) were single. The study's findings also showed that 39% of the respondents were physicians. In addition, 74% of respondents had worked for less than five years, 13% for six to ten years, and a further 13% for ten years or more. The most reliable source of information for blood-borne infections (89.1%) and needle stick injuries (78.4%) was the Teaching Hospital. Of the 109 people who had needle stick injuries at that time, 84.4% had done so fewer than five times in the previous six months, and 4.6% had done so more than ten times. For the last six months, Tin. According to the results, 16.5% of the participants in this category suffered an intravenous insertion needle stick injury, 18.3% during an injection, and 60% while recapping a needle. Males were also found to have a greater frequency of needle stick injuries (66.3%) than females, with medical professionals and those with six to ten years of experience having the highest prevalence. However, medical lab scientists had a greater prevalence of blood-borne infections (20.7%). The outcome demonstrated negative opinions regarding blood-borne infections and needle stick injuries.

Keywords: Needlestick injury; Pathogen, Health care worker.

1. Introduction

A needle stick injury (NSI) is the penetration of the skin by a hypodermic needle or other sharp objects that have been in contact with the blood, tissue or other body fluids before their exposure [1] Needle stick injury is a threat to health care workers as it may expose health care workers to blood borne pathogens. Health care professionals are at higher risk for needle stick injuries are Surgeons, emergency room workers, laboratory room professionals and nurses. Blood borne pathogens are infectious microorganisms in human blood that can cause disease in humans. There are more than twenty blood borne diseases. However, the commonest pathogens for concern are the blood borne viruses which include hepatitis (HBV), Hepatitis C (HCV), and human immunodeficiency virus (HIV)[2].

The risk of seroconversion following NSI is highest in HBV (6- 30%). Followed by HCV (0.5-10%) and it's lowest for HIV (0.3%). It is a known fact that health care workers have the highest risk for needle stick injury and its resultant blood borne pathogen. However, this can have negative impact on their physical and mental health. The consequences of exposure include anxiety, fear, and emotional distress; in addition, they can result in infection, illness, disability, psychiatric morbidity and even death. Infections with blood borne pathogens generally reduces quality of life ,there is financial burden on the affected persons, also, there is reduced job opportunities as they run the risk of infection to their patients. Due to the points mentioned earlier, this study aims to address the critical need to document the various factors that impact needle stick injuries and blood borne pathogens among healthcare workers. It would also offer crucial insights to help healthcare workers adopt safer work practices, contributing to infection prevention and contro [3]. The prevalence of needle stick injuries and blood borne pathogens in this region is significantly underreported. The results of this study will serve as an important point of reference for the scientific community and the overall body of knowledge. This implies that it will be a valuable source of information for other researchers and future studies, as well as being beneficial for the general public. The aim of this study is to significantly contribute to the assessment of the factors accountable for these injuries and infections experienced by healthcare workers at Benue State University Teaching Hospital, Makurdi.

2. Materials and Methods

2.1 Study Area

Benue State is one of the North Central states in Nigeria with a population of about 4,253,641 in the 2006 census. The state was created in 1976 [4] and was among the seven states created at that time. The state derives its name from the Benue River which is the second largest river in Nigeria after the River Niger [5]. The state borders Nasarawa State to the North; Taraba State to the East; Kogi State to the West; Enugu State to the South-West; Ebonyi and Cross-Rivers State to the South; and has an international border with Cameroon to the South-East [6]. It is inhabited predominantly by the Tiv, Idoma, and Igede people. Minority ethnic groups in Benue are Etulo, Igbo, and Jukun people, etc. Its capital is Makurdi [7]. Benue is a rich agricultural region; common crops include oranges, mangoes, sweet potatoes, cassava, soya bean, guinea corn, flax, yams, sesame, rice, groundnuts, and palm trees. Benue State is a legacy of an administrative entity that was carved out of the protectorate of northern Nigeria at the beginning of the twentieth century. The territory was initially known as Munshi Province until 1918 when the name of its dominant geographical feature, the Benue River was adopted [8]. Benue State is named after the Benue River and was formed from the former Benue-Plateau State in 1976, along with Igala and some part of Kwara State [9]. In 1991, some areas of Benue state (mostly the Igala-speaking area), along with areas in Kwara State, were clubbed together to form the new Kogi State. Igbo people are found in the boundary areas like the Obi, Oju, and Ado Local Government Areas. It is known as the "Heartbeat of the Middle Belt" and the "Entertainment Capital of the Middle Belt" north of the Niger River. Otukpo, the Idoma people's traditional and administrative capital, is also known as the Lion's Heart and the Land of the Brave [7].

2.2. Study Design

Thus study was a cross-sectional descriptive study.

2.3. Study Population

The individuals being studied are healthcare professionals such as doctors, nurses, and staff members who care for patients at BSUTH, Makurdi in Benue State.

Criteria for inclusion: This includes all doctors, nurses, and medical laboratory scientists currently employed at BSUTH who provide care to patients, as well as healthcare workers who have been at the facility for at least 6 months.

Criteria for exclusion: This applies to those who were not present during the data collection period and to doctors, nurses, and medical laboratory scientists who are not willing to take part in the study.

2.4. Sample Size Determination

The sample size was calculated using the Cochran Formula for cross sectional studies where the minimum sample size,

$N=Z^2 (PQ)/D^2$ where

N=Sample size

Z= Confidence interval at 95% level of significance given as 1.96

$N= Z^2 (pq/d^2)$

P=Reference prevalence

Q= 1-P

D= Maximum sampling error allowed= 0.05

Thus :$N=Z^2 P(1-P) d^2$

The calculation utilized the average prevalence of needle stick injury and blood borne pathogen from a previous study, denoted as p. The prevalence of needle stick injury is 75.5%. The prevalence of blood borne pathogen is 38%. The average of these two prevalence is 56.75%. Thus, p equals 0.5675; Q equals 0.432, Z equals 1.96, and D equals 0.05. As a result, N equals 1.62 multiplied by 0.5675, divided by 0.052, which equals 251.3344.

Therefore, our study sample size was 251+10% of the sample size.

10% of 251=25.1

N=251=25.1

=276.1

2.5. Sampling Technique

The study utilized a stratified sampling approach, with each stratum representing a department, and further subdivided into two strata based on gender to ensure equal participation across genders and departments. Participants meeting the inclusion criteria were selected from each stratum using a simple random sampling method to ensure an equal chance of inclusion in the study.

2.6. Study Instrument

A structured, self-administered questionnaire was used for data collection and consisted of four sections A-D.

Section A: Social Demographic data

Section B: Factors influencing needle stick injury among HCW

Section C: Factors influencing blood borne pathogens among HCW

Section D; Effect on job performance

2.7. Data Collection

The data was obtained using a pretested self-administered questionnaire. The questionnaire was further collected based on new information after pretest.

2.8. Data Management Plan

Variables were measured in the study.

Social demographic variables were included in Section A, with each response being assigned a unique value. Section B, C, and D focused on factors related to needle stick injury, blood borne pathogens, and their impacts on job performance, respectively. A value of one was assigned for every positive response and zero for every negative response, and then the values were converted to percentages.

DATA ANALYSIS: The questionnaires were manually sorted and then analyzed using the IBM SPSS version 25 statistical package on a computer. After the data was cleaned, the results were presented in tables.

2.9. Ethical Consideration

Permission was obtained from the Hospitals Ethical Committee with proper explanation of the research work. The nature, purpose and processes of the study were well explained to the participants to obtain an informed consent before proceeding. Respondents were assured of the confidentiality, privacy and anonymity of information provided and that the information shared during the interview were treated as confidential and private.

2.10. Limitation of the Study

Time and resources were the anticipated limiting factor as this study was carried out during the busy clinic activities. Similarly, lack of cooperation among respondents was a significant concern, incomplete filling of the

questionnaire and poor understanding of the questionnaire. However, these limitations were handled by proper explanation of the study expectations to both the people's in charge at each department. And to the patients as well as how they collected the data were helped developed and innovative strategy to combat needle stick injury and blood borne pathogens among health workers in BSUTH.

3. Results

Table-1.

Socio demographic	**Frequency**	**Percent**
20-25	133	48.2
26-35	80	29.0
36-45	45	16.3
46-55	17	6.2
56 And Above	1	0.4
Gender		
Female	190	68.8
Male	86	21.2
Tribe		
Igbo	260	94.2
Yoruba	15	5.4
Hausa	1	0.4
Religion		
Christianity	257	93.1
Islam	17	6.2
Traditionalist	2	0.7
Marital Status		
Married	86	31.2
Single	177	64.1
Separated	13	4.7
Qualifications		
Doctor	108	39.1
Nurses	79	28.6
Med Lab Scientist	58	21.0
Did not specify	31	11.2
Years In Service		
0-5	13	74
6-10	87	13
>10 years	0	0

Table 1 above shows that the respondents were aged between 20 and above with almost half (48.2%) of them falling within 20-25 years. More than half 68.8% were females. Majority of the respondents 94.2% and 93% were Igbo and Christian respectively while 64.1% of the respondents were married. The result shows that 39% were medical doctors.

Table-2. Knowledge and factors influencing needle-stick injury among health care workers in BSUTH

HEARD OF NEED STICK INJURIES	Percentage
Yes	93.8
No	6.2
SOURCE OF AWARENESS OF NEEDLE STICK INJURIES	
Home	10.8
School	78.4
Media	24.3
Church	3.1
Market	0.4
Others	0.4

Result from table 2 above shows that highest source of awareness for needle stick injury as outlined by the respondents was the school (78.4%), this was followed distantly by the media (24.2%) and the least among the sources was the market (0.4%).

Table-3.

More variables on knowledge	**Frequency (n=259)**	**Percentage**
Thinks it is a cause of concern in health institutions		
Yes	12	4.6
No	247	95.4
Infections transmitted through needle stick injuries		
HIV	248	95.8
HCV	181	69.9
HBV	180	69.5
Malaria	36	13.9
Thinks the infections are life threatening		
No	16	6.2
Yes	243	3.8
Variables On Factors Influencing Needle Stick Injury	**Frequency**	**Percentage**
What causes the Injury		
Recapping	65	59.6
During intravenous insertion	18	16.5
During injection	20	18.3
While drawing blood	12	11.0
During disposal	15	13.8
It was not protected	13	11.9
Collided with another staff	3	2.8
Was overworked and sleepy	10	9.2
Heard About Blood Borne Pathogen	**Frequency**	**Percentage**
Yes	240	93.5
No	19	6.5

The result in the table 2 above shows that there is good knowledge of needle stick injury (95.4%) of the respondents perceived that needle stick injury should be a source of concern in the health institution. The result shows the respondents perceived that HIV was the highest infection that could be transmitted through needle stick injury and the least infection that were outlined was malaria. Also the result shows that 93.8% perceived that the infection arising from needle stick injuries was life threatening. The table also assessed the factors influencing needle stick injury among health care workers in BSUTH and among the 109 who had sustained needle stick injury, result in he table 2 above shows that 60% of this category sustained needle stick injury while recapping a needle, 18.3% of them sustained the injury during injection and 16.5 sustained the injury during intravenous insertion. The result shows that the least cause of needle stick injury was collision with a staff (2.8%). Also the result showed that 53% of the respondents agreed there were presence of reporting protocol in their hospital. Finally, the result showed that 93.5% of the respondents had heard about blood borne pathogen.

Table-3a. Level of knowledge of blood borne infections among healthcare workers in Benue State University Teaching Hospital

Knowledge of Blood borne pathogen	**Frequency**	**Percentage**
Where did you hear about Blood borne pathogen		
Home	30	11.6
School	230	89.1
Media	66	25.6
Church	3	1.2
Market	4	1.6
Common Blood borne pathogens		
Syphilis	107	41.5
HIV	220	85.3
Malaria	94	36.4
HBV	169	65.5
HCV	142	55.0
What are the common blood borne pathogens known for		

Cause life threatening infections	218	84.5
Cause self-limiting diseases	14	5.4
Cause curable infections	8	3.1
Have no cure	55	21.3
Do you think reporting the incidence of the exposure is useful in the environment		
No	38	14.7
Yes	221	85.3
Prevalence of Blood borne pathogens	**Frequency**	**Percentage**
Have you been exposed to patient body fluid		
No	115	44.2
Yes	144	55.8

Result in the table above shows that there is good knowledge of blood borne pathogens infections. 89% heard about blood borne pathogen from school, 25.6% heard from the media and the least within that category was the church. It is well shown that the commonest blood pathogen to be HIV, Followed by HBV, HCV and the least in that category was malaria. The result shows that 84.5% perceived that the blood borne pathogen cause life threatening infections and 21% believed it has no cure and 55.8% of the respondents have been exposed to patients body fluids.

Table-4. To determine the prevalence of needle stick injury among healthcare workers in BSUTH

	Ever had needle prick injury		Total	Chi-square (p-value)
	No	Yes		
Age Category				
20-25	84(63.8)	49(36.8)	133(100)	0.248FT
26-35	39(41(51.2)	41(51.2)	80(100)	
36-45	26(57.8)	19(42.2)	45(100)	
46-55	9(52.9)	8(47.1)	17(100)	
55 and above	1(100)	0(0)	1(100)	
Gender				
Female	102(53.7)	88(46.3)	190(100)	3.846(0.050)
Male	57(66.3)	29(66.3)	86(100)	
Marital status				
Single	108(61.0)	69(39.0)	177(100)	2.963(0.227)
Married	43(50.0)	43(50.0)	86(100)	
Separated	8(61.5)	5(38.5)	13(100)	
Divorced	-	-	-	-
Widowed	-	-	-	-
Qualification				
Doctor	53(49.1)	55(50.9)	108(100)	8.425(0.015)
Nurses	44(55.7)	35(44.3)	79(100)	
Medical Lab	42(72.4)	16(27.6)	58(100)	
Others	-	-	-	-
Work experience				
0-5	123(60.3)	81(39.7)	204(100	7.996(0.018)
6-10	13(36.1)	23(63.9)	36(100)	
Moe than 10 years	23(63.9)	13(36.1)	36(100)	
How many times for the past 6 months have sustained needle stick injury	Frequency N=109			
Less tha 5 times	92	84.4		
>5times but <10 times	12	11.0		
More than 10 times	5	4.6		

The result from the table above showed that prevalence if needle stick injury was highest (63.9%) and statistically significant with those who had worked between 6-10 years ,p=0.0018. Also the result shows that

prevalence of needle prick injury was highest among the medical doctors (50%) when compared to the other cadre, p=0.015. Also, the result shows that 84.4% had sustained less than 5 times in the last 6 months and 4.6% of them had sustained needle stick injury for more than 10 times in the last 6 months.

Table-5.

	Ever been diagnosed with blood borne pathogen		Total	Chi-square (p-values)
	NO	YES		
Age category				
20-25	122(91.7)	11(8.3)	133(100)	0.527FT
26-35	76(95.0)	4(5.0)	80(100)	
36-45	40(88.9)	5(11.1)	45(100)	
46-55	15(88.2)	2(11.8)	17(100)	
55 and above	1(100)	0(0)	1(100)	
Gender				
Female	178(93.7)	12(6.3)	190(100)	2.277(0.131)
Male	76(88.4)	10(11.6)	86(100)	
Marital status				
Single	164(92.7)	13(7.3)	177(100)	1.0720(0.585)
Married	79(91.9)	7(8.1)	86(100)	
Separated	11(84.6)	2(15.4)	13(100)	
Divorced	-	-	-	-
Widowed	-	-	-	-
Qualification				
Doctor	102(94.40	6(5.6)	108(100)	
Nurses	75(94.9)	4(5.1)	79(100)	
Med lab Scientist	49(79.3)	12(20.7)	58(100)	
Work Experience				
0-5	189(92.6)	15(7.4)	204(100)	0.663FT
6-10	33(91.7)	3(8.3)	36(100)	
>10 years	32(88.9)	4(11.1)	36(100)	
Have you been diagnosed of any blood borne pathogen	**Frequency N=259**	**percentage**		
No	238	91.9		
Yes	21	8.1		
Reporting exposure	Frequency	Percentage		
No	96	66.7		
Yes	48	33.3		

Result of this table shows that the prevalence if blood borne pathogens was highest in the Medical Laboratory Scientists (20.7%), p=0.002. Also, 8.1% had been diagnosed with blood borne pathogen and 33.3% of the respondents made reports of their exposure to body fluids.

Table-6. Did you get tested for HIV, HBV, and HCV

Did you get tested for HIV,HBV,HCV	Frequency n=144	Percentage
Yes	88	61.8
No	56	38.2
Which one of the blood borne pathogens were you diagnosed	**Frequency (n=21)**	**Percentage**
HCV	4	28.6
HIV	10	47.6
HBV	5	42.9
Took prophylaxis after exposure	**Frequency (n=21)**	**Percentage**
Yes		36.8
No		63.2

Table-7. Effect of these factiors on the work performance

Effects of work place injury on the work performance	**Frequency (n=40)**	**Percentage**
If yes, were you still able to handle work without fear		
Yes	8	20
No	32	80
Did you experience a panic attack due to injury		
No	14	35
Yes	26	65
Ever Had symptoms of depression		
No	19	47.5
Yes	21	52.5
Did you ever miss work because of the injury		
No	28	70
Yes	12	30
Fears about sustaining the injury		
I was scared of the pain	5	12.5
It could render me handicapped	2	5.0
I was scared it may expose me to blood borne infection	31	77.5
I was scared I may lose my job if people found out	1	2.5

Results from Table 6 shows that 20% were not able to handle work FTER THEY SUSTAINED NEEDLE STICK INJURY at the work place. 65% experienced panic attacks, 52.5% had symptoms of depression, and 30% missed work. Finally result show that the highest fear that the respondents had about sustaining injury was that it would expose them to blood borne infection (77.5%) and 12.5% were scared it would expose them to pain.

4. Discussion and Conclusion

The study revealed that healthcare professionals currently in practice, aged between 20 and 55 years, were the focus during the data collection period. This age range did not align with the findings from ESUTH Teaching Hospital Enugu, which indicated ages ranging from 17 to 57. The research showed a high level of awareness regarding blood borne pathogens, with over 90% of the participants identifying them, a figure close to previous studies, including one conducted in Abha, Saudi Arabia. Additionally, 84.5% of the respondents considered blood borne pathogens to be life-threatening, matching the results from Abdullah et al., where 65.8% of healthcare workers acknowledged the risk associated with these pathogens. The findings also indicated that healthcare workers were knowledgeable about the most common blood borne pathogens, including HIV, HBV, and HCV, in line with research byAmira CO [10], which highlighted these as the most prevalent pathogens transmitted through needle stick injuries [11]. The study concurred with Ritiga et al., stating that HBV, HCV, and HIV were the most common blood borne pathogens transmitted through needle stick injuries. Furthermore, the research determined that the incidence of needle stick injuries was 42%, significantly higher than the 5% reported by Butsashvili, *et al.* [12]. The study suggested that needle stick injuries were most likely to occur during the process of needle recapping, a finding consistent with Butsashvili, *et al.* [12].'s research, which identified this as the highest risk period for needle injuries due to false movements. It was also noted that the primary cause of needle stick injuries was during the recapping process, in agreement with Butsashvili, *et al.* [12] findings that this was the highest risk activity. The study found that age, marital status, and the source of information on needle stick injuries did not significantly influence the occurrence of these injuries, contradicting a study from Iran that suggested age and gender were risk factors for needle stick injuries. Moreover, the study revealed that male healthcare workers had a higher prevalence of needle stick injuries (66.3%) compared to female healthcare workers (46.3%), which is consistent with previous research in Amhara, Ethiopia, showing male healthcare workers were 10 times more likely to experience needle stick injuries.

It was also deduced from the study that the major cause of needle stick injury was during recapping and this conforms to findings in Butsashvili, *et al.* [12] which found that the highest rate of needle injury happened during needle recapping as a result of false move. It is also in agreement with the similar study in Lagos where 45 & of the respondents indicates that recapping of needle was the highest cause of needle stick injury [13] It was also deduced that age, marital status and source of information on needle stick injury did not significantly affect the prevalence of needle prick injuries and this negates findings in an Iranian study which outlined age and gender as some of the risk factors for the needle stick injuries in that country [14] Also, it was deduced from the study that male gender had higher prevalence (66.3%) of needle stick injury when compared to the female health workers (46.3%) and this obviously corresponds to earlier literature in Amhara regions state of North West Ethiopia where the male health workers were 10 times higher in experiencing needle stick and sharp injury than females [15]. Moreover, from this study, it was shown that the direct occupation of the health workers affected the prevalence rate within that group as the highest prevalence rate was found among Medical Doctors (50%; p=0.015), however, this is not in line with

findings in Butsashvili, *et al.* [12] which showed that years of work experience influenced the prevalence of NSI as it was highest (63.9%) with those who have worked between 6-10 years, p=0.018. This is also very close to the Nigeria study where those who had worked between 6-10 years had higher prevalence of needle stick injury p=0.016 [13] .This study also found that only 9.2% indicated they had needle stick injury as a result of work overload, however, some important findings were issues like work overload and this was very low staffing and lack of organization in certain units put the nurses at the risk of needle stick injuries, as a matter of fact, that study concluded that imperative of understaffing and paucity of administrative support can increase the risk and exposure to needle concluded that imperative of understaffing and paucity of administrative support can increase the risk and exposure to needle stick injuries.

The study's results indicate that over half of healthcare workers have come into contact with bodily fluids, and that the prevalence of blood-borne infections among them was 8.1%. Additionally, the study found that there was a professional dimension to the incidence of blood pathogens, with the highest rates among medical lab scientists, medical doctors, and interns [16] The study also found that 65% of healthcare workers experienced a panic attack, which is consistent with the findings of the American Journal of infection control by [17] which showed that 53% of workers experienced anxiety. Regarding depression, both studies showed a higher prevalence of anxiety, but the prevalence of depression was significantly higher among workers.. Nonetheless, our study found a much greater rate of melancholy (52.5%).The growing rate of neglect in our healthcare context may be the cause of the higher rate of depression.

Consequently, this study suggests that BSUTH prioritize blood-borne infections and needle stick injuries by teaching and training healthcare personnel. There should be more efforts made to remind medical professionals of the risks. Nonetheless, our study found a much greater rate of melancholy (52.5%).The growing rate of neglect in our healthcare context may be the cause of the higher rate of depression. Consequently, this study suggests that BSUTH prioritize blood-borne infections and needle stick injuries by teaching and training healthcare personnel. More should be done to educate healthcare professionals about the risks associated with needle stick injuries. Regular evaluations should also be conducted from time to time to assess how well hospital policies and procedures are working to lower the incidence of blood-borne infections and needle stick injuries among healthcare professionals. Male healthcare professionals should also receive more attention because research has shown that they are more likely to have needle stick injuries and be diagnosed with blood-borne infections. Tight guidelines need to be created for handling bodily fluid exposure, and fewer than 40% of those who reported and received a diagnosis did so without taking any kind of medicine thereafter. Lastly, medical facilities ought to form committees to oversee the management and reporting of needlestick injuries to staff.

Acknowledgement

The Authors sincerely acknowledged the efforts of all the participants including the Surveyors, whom in their tight schedules made out time to respond to the questionnaires as appropriate. Also, all the staff of Benue State University Teaching Hospital, Makurdi, Benue State Nigeria. In fact, you are wonderful.

Conflict of Interest

There authors have none to declare

Source of Funding

This study did not received any funds from anybody or organization but was solely on self-sponsorship by the contributors.

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