



## Clinical Data of Patients with Wounds Attending Government Hospitals in Ondo State, Nigeria

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### **Authors' contributions**

*This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.*

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### **ABSTRACT**

Clinical data of patients with wounds attending government hospitals in Ondo state, Nigeria was investigated. It was observed that most patients with wound that visited government hospitals in Ondo state were 45-54 years age group with percentage of 41.0%. The most gender that visits government hospitals for the treatment of wound was male in the course of the research with the percentage of 59.3%. In the course of the study 31.0% of the respondents that participate in the survey were single while 69% were married. Self-employed had the highest percentage distribution of 27.8% while driver had the lowest percentage of 4.8%. Most of the respondents reside in Akure while Ilara had the lowest respondent patients with wounds that visited hospitals in the course of the study. Four-point-five percent (4.5%) of the patients with wounds were diagnosed with diabetes and 4.0 percent of the respondents were on diabetes drug. Eighteen-point-three percent (18.3%) of the patients with wounds take alcohol. Patients with wounds that take alcohol regularly were 16.3% while 2.0% take alcohol occasionally. In the course of the survey at government hospitals in Ondo State, 9.3% of the respondent smoke cigarette. Two-point-five percent (2.5%) smoke regularly while 6.8% smoke occasionally. Thirty-six-point five percent (36.5%) of the patients with wounds were on traditional herb. Patients with wounds that take traditional herb were 16.8%, 19.8% takes traditional herb occasionally, while 63.5% of the respondent did not take at all. None of the patient was diagnosed with obesity.

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## 1. INTRODUCTION

A wound is a break in the integrity of the skin or tissues, which may be associated with disruption of the structure and function. Another way, a wound may be defined as disruption of the normal continuity of bodily structures due to trauma, which may be penetrating or non-penetrating [1]. Wounds are inescapable events of life, which arise due to physical injury, chemical injury and microbial infections. It is defined simply as the disruption of the cellular and anatomic continuity of a tissue [2]. Open injuries have a potential for serious bacterial wound infections, including gas gangrene and tetanus, and these in turn may lead to long term disabilities, chronic wound or bone infection, and death. Wound infection is particularly of concern when injured patients present late for definitive care or in disasters where large numbers of injured survivors exceed available trauma care capacity. Cutaneous lesions may have a variety of forms and appearance at initial presentation, including small papules or vesicles that progress into a rapidly spreading cellulitis [3] with a characteristic serosanguineous draining fluid, single necrotic bullae [4], and gas-gangrenelike infections with extensive soft tissue involvement resembling clostridial myonecrosis [3]. Single or multiple papulovesicular lesions can even mimic cutaneous anthrax [3,4]. Necrotic or hemorrhagic bullous lesions [4] such as those observed in our patient, are rare. Exposed areas such as extremities and digits are most often affected, presumably due to entrance of spores from soil, water, decaying organic material, or fomites through skin microabrasions or trauma induced wounds [3]. Once in the tissue, the crystalline surface protein layer (S-layer) of the *bacilli* promotes adhesion to human epithelial cells and neutrophils, followed by release of virulence factors including proteases, collagenases, lecithinase like enzymes, necrotizing exotoxin like hemolysins, phospholipases, and most importantly a dermonecrotic vascular permeability factor [5,3]. Toxins produced by *B cereus* are similar to those closely related to *Bacillus anthracis*, the agent of anthrax [3].

Normal wound healing requires a sufficient supply of blood to the affected tissues. A delay in healing can be caused by a number of factors, both local (related to the wound itself) and systemic (related to the patient and their clinical condition). Many of these factors not only delay

healing but also increase the likelihood of infection developing in the wound.

Local factors which may delay wound healing include [6,7]: (a) The underlying cause and severity of the wound, (b) A delay in the patient presenting for medical attention, (c) The presence of necrotic tissue in the wound – this can promote the growth of bacteria, especially anaerobes, (d) The presence of foreign bodies in the wound, (e) Impairment of the local circulation, (f) The site of the wound, e.g. wounds near the anal area are at increased risk of contamination, (g) A haematoma or any “dead space” in a wound – this can provide an ideal environment for bacterial growth, (h) An Oedema in the tissues surrounding the wound, and (i) Continued trauma or pressure to the wound site

Systemic factors which may delay wound healing include: [8,7] (a) Predisposing medical condition, e.g. diabetes, which compromises the health of the skin and increases the risk of infection, (b) Older age, (c) Obesity, (d) Smoking, (e) Poor nutrition, and (f) Immunosuppression associated with either an illness, e.g. AIDS, or medicine, e.g. chemotherapy, corticosteroids.

The aim of this study was to investigate the clinical data of patients with wounds attending government hospitals in Ondo State, Nigeria.

## 2. MATERIALS AND METHODS

### 2.1 Description of Study Location

This research work was carried out from October 2018 to May 2019 in Ondo state, Nigeria. The study area for this research is Ondo, Nigeria. Ondo state covers an area of 15,195.2 square kilometers and lies at latitude 7°10' North and longitude 5°05' east. Ondo State is a state in Nigeria created on 3 February 1976 from the former Western State. It originally included what is now Ekiti State, which was split off in 1996. Akure is the state capital. Each Nigerian state has several ministerial offices representing the federal government. Ondo state borders Ekiti state to the north, Kogi State to the northeast, Edo State to the east, Delta State to the southeast, Ogun State to the southwest, and Osun State to the northwest. The state contains eighteen local government areas, the major ones being Akoko, Akure, Okitipupa, Ondo and Owo. The ethnic composition of Ondo State is largely from the Yoruba sub groups of the Akoko, Akure,

Okitipupa, Ilaje, Ondo and Owo people. Ijaw such as Apoi and Arogbo populations inhabit the coastal areas, while a sizable number of the Ondo State people who speak a variant of the Yoruba language similar to Ife dialect reside in Oke-Igbo.

To supplement the efforts of the federal medical centre, Owo and University of Medical Sciences Teaching Hospital, Akure, in this regard, there are other government health centres and private clinics. 'Abiye' health programme of Governor Mimiko administration was recognized by World Health Organization (WHO) as one of the best health programmes on maternal health programme with the establishment of Mother-Child hospital in Akure.

## 2.2 Administration of Questionnaire

Questionnaires containing relevant information were administered to the Laboratory scientists to fill in the information about the patients (117 inpatients and 283 outpatients). Swab Samples of wound from the patients attending University of Medical Sciences Teaching Hospital, Akure and Federal Medical Center, Owo, was collected between October 2018 and May 2019. The questionnaires contained information about the age, gender, marital status, educational status, occupational status, city of residence, patients with wounds and diabetes, patients with wounds and diabetes on diabetic drug, alcohol intake, frequency of alcohol intake, cigarette smoker, how frequent patients with wounds smoke

cigarette, patients with wounds currently on traditional herbal medication, how frequent patients with wounds take traditional herbal medication and observe patients with wounds were included in the questionnaire.

## 2.3 Statistical Analysis of Data

Each treatment was replicated three times and data obtained were subjected to one way analysis of variance (ANOVA) and Duncan's new Multiple Range Test at  $p < 0.05$  using Statistical Package for Social Sciences version 23.0.

## 3. RESULTS

The age distribution of patients with wounds is presented in Table 1. The highest age group of patients with wounds that visited government hospitals was 50-69 years with 41.0%, while the least age range was < 12 year old in the course of the research.

The Gender Distribution of patients with wounds attending hospitals in Ondo State was shown in Table 2. Male patients with wounds were the highest gender with 59.3% while the female patients with wounds were 40.8%.

Table 3 shows the marital status of patients with wounds attending government hospitals in Ondo state. Six-Nine percent (69%) of the observed sample population were married while 31.0% were single in the course of the research.

**Table 1. Age distribution of patients with wounds attending hospitals in ondo state**

Age range	Frequency	Percent	Valid percent	Cumulative percent
Valid less than 12 years	8	2.0	2.0	2.0
12-17	21	5.3	5.3	7.3
18-24	28	7.0	7.0	14.3
25-34	29	7.3	7.3	21.5
35-44	25	6.3	6.3	27.8
45-54	164	41.0	41.0	68.8
55-64	51	12.8	12.8	81.5
65-74	44	11.0	11.0	92.5
75 and above	30	7.5	7.5	100.0
Total	400	100.0	100.0	

**Table 2. Gender distribution of patients with wounds attending hospitals in ondo state**

Gender	Frequency	Percent	Valid percent	Cumulative percent
Valid Male	237	59.3	59.3	59.3
Female	163	40.8	40.8	100.0
Total	400	100.0	100.0	

**Table 3. Marital distribution of patients with wounds attending hospitals in ondo state**

Marital Status		Frequency	Percent	Valid percent	Cumulative percent
Valid	Single	124	31.0	31.0	31.0
	Married	276	69.0	69.0	100.0
	Total	400	100.0	100.0	

**Table 4. Educational status distribution of patients with wounds attending hospitals in Ondo state**

Educational status		Frequency	Percent	Valid percent	Cumulative percent
Valid	Primary School	42	10.5	10.5	10.5
	Secondary school	96	24.0	24.0	34.5
	Tertiary School	152	38.0	38.0	72.5
	None	110	27.5	27.5	100.0
	Total	400	100.0	100.0	

**Table 5. Occupational status distribution of patients with wounds attending hospitals in Ondo state**

Occupational status		Frequency	Percent	Valid percent	Cumulative percent
Valid	Civil Servant	30	7.5	7.5	7.5
	Self Employed	111	27.8	27.8	35.3
	Unemployed	99	24.8	24.8	60.0
	Farming	70	17.5	17.5	77.5
	Driver	19	4.8	4.8	82.3
	Butcher	24	6.0	6.0	88.3
	Business	47	11.8	11.8	100.0
	Total	400	100.0	100.0	

Table 4 shows the educational status of patients with wounds. Those that their level of education was primary school were 10.5%, follow by secondary school education which was 24.4%, tertiary education were 38.0%, while those that did not go to school at all were 27.5%.

Occupational status distribution of patients with wounds attending hospitals in Ondo States presented in Table 5. Self-employed had the highest frequency of 27.8% followed by unemployed 24.8%, farming 17.5%, Business 11.8%, Civil servant 7.5%, Butcher 6.0% and driver 4.8%

Table 6 shows the city of resident of patients with wounds. Most of the patients with wounds that visited government hospitals were resident of Akure community with the percentage of 42.3%, followed by Owo with the percentage of 21.0%, Akoko, Igara Oke and Bolunduro had 8.3% respectively, Okitipupa 8.0% and Ilara 4.0%.

Table 7 shows the patients with wounds diagnoses with diabetes in Ondo State. It was observed that 4.5% of the patients with wounds were with diabetes while 95.5% were diabetes free.

**Table 6. City of residence distribution of patients with wounds attending hospitals in Ondo state**

City of residence		Frequency	Percent	Valid percent	Cumulative percent
Valid	Akure	169	42.3	42.3	42.3
	Ilara	16	4.0	4.0	46.3
	Owo	84	21.0	21.0	67.3
	Akoko	33	8.3	8.3	75.5
	Igbara Oke	33	8.3	8.3	83.8
	Okitipupa	32	8.0	8.0	91.8
	Bolunduro	33	8.3	8.3	100.0
	Total	400	100.0	100.0	

**Table 7. Patients with wounds diagnose with diabetes attending hospitals in ondo state**

Diagnose with diabetes		Frequency	Percent	Valid percent	Cumulative percent
Valid	Yes	18	4.5	4.5	4.5
	No	382	95.5	95.5	100.0
	Total	400	100.0	100.0	

**Table 8. Patients with wounds diagnose with diabetes on diabetes drug attending hospitals in ondo state**

Diabetes patient on diabetes drug		Frequency	Percent	Valid percent	Cumulative percent
Valid	Yes	16	4.0	88.9	88.9
	No	2	0.5	11.1	100.0
	Total	18	4.5	100.0	
Missing	Not diagnose with diabetes	382	95.5		
Total		400	100.0		

**Table 9. Alcohol intake of patients with wounds attending hospitals in ondo state**

Alcohol intake		Frequency	Percent	Valid percent	Cumulative percent
Valid	Yes	73	18.3	18.3	18.3
	No	327	81.8	81.8	100.0
	Total	400	100.0	100.0	

Patients with wounds diagnose with diabetes on diabetes drug attending hospitals in Ondo State is presented in Table 8. Four percent (4.0%) of the patients with wounds were on diabetes drug while 0.5% of the patients with wounds were not on diabetes drug.

Table 9 shows the alcohol intake of patients with wounds in Ondo State. It was observed that 18.3 % of the patients with wounds take alcohol while 81.8% did not take alcohol.

Frequency of alcohol intake of patients with wounds in Ondo attending government hospitals is presented in Table 10. Sixteen-point-Three percent (16.3%) of the patients with wounds takes alcohol regularly, 2.0% of the patients with wounds takes alcohol occasionally while 81.8% does not take alcohol at all.

Frequent cigarette intake of patients with wounds in Ondo State is presented in Table 11. Nine-point-three percent (9.3%) smoke cigarette while 90.3% of the patients with wounds does not smoke cigarette at all.

Table 12 shows how frequent patients with wounds attending hospitals in Ondo State smoke cigarette. Two-point-five percent (2.5%) of the patients with wounds smoke cigarette, 6.8% does not smoke occasionally while 90.8 percent does not smoke at all.

Patients with wounds currently on traditional herb is presented in Table 13. Thirty-six-point-five percent (36.5%) of the wound attending government hospitals patient takes traditional herb while 63.5% of the patients with wounds did not takes traditional herb at all.

**Table 10. Frequency of alcohol intake of patients with wounds attending hospitals in Ondo state**

How often do you take alcohol		Frequency	Percent	Valid percent	Cumulative percent
Valid	Regularly	65	16.3	89.0	89.0
	Occasionally	8	2.0	11.0	100.0
	Total	73	18.3	100.0	
Missing	None alcohol taker	327	81.8		
Total		400	100.0		

**Table 11. Cigarette intake of patients with wounds attending hospitals in Ondo state**

Do you smoke		Frequency	Percent	Valid percent	Cumulative percent
Valid	Yes	37	9.3	9.3	9.3
	No	363	90.8	90.8	100.0
	Total	400	100.0	100.0	

**Table 12. How frequent patients with wounds attending hospitals in Ondo state smoke cigarette**

How often do you smoke		Frequency	Percent	Valid percent	Cumulative percent
Valid	Regularly	10	2.5	27.0	27.0
	Occasionally	27	6.8	73.0	100.0
	Total	37	9.3	100.0	
Missing	Non Smoker	363	90.8		
Total		400	100.0		

**Table 13. Patients with wounds currently on intake of traditional herb attending hospitals in Ondo state**

Traditional herb		Frequency	Percent	Valid percent	Cumulative percent
Valid	Yes	146	36.5	36.5	36.5
	No	254	63.5	63.5	100.0
	Total	400	100.0	100.0	

**Table 14. How frequent patients with wounds attending government hospitals in ondo state take traditional herb**

Traditional herb intake		Frequency	Percent	Valid percent	Cumulative percent
Valid	Regularly	67	16.8	45.9	45.9
	Occasionally	79	19.8	54.1	100.0
	Total	146	36.5	100.0	
Missing	Don't use traditional herb	254	63.5		
Total		400	100.0		

**Table 15. Patients with wounds diagnose with obesity attending hospitals in ondo state**

Patient diagnose with obesity		Frequency	Percent	Valid percent	Cumulative percent
Valid	No	400	100.0	100.0	100.0

Table 14 shows how frequent patients with wounds attending government hospitals in Ondo State take traditional herb. It was observed that 16.8% of the patients with wounds takes alcohol regularly, 19.8% takes alcohol occasionally while 63.5% of the patients with wounds did not takes traditional herb at all.

Table 15 shows patients with wounds diagnose with obesity attending government hospitals in Ondo State. None of the patients with wounds was diagnose with obesity in the course of the research.

#### 4. DISCUSSION

The aim of this study was to investigate the clinical data of patients with wounds attending government hospitals in Ondo state, Nigeria. It was observed that most patients with wound that visited government hospitals in Ondo State were 45-54 years age group with percentage of 41.0%. Specific age-related changes in the coagulation and immune systems which may influence wound healing include alterations in cell adhesion, migration and functional responses. Gould and Fulton [9] reported that

impaired wound healing in the elderly represents a major clinical problem that is growing as our population ages. Wound healing is affected by age and by co-morbid conditions, particularly diabetes and obesity [9]. A recent study using an ex-vivo model demonstrated that application of a compressive load to ischemic aged skin resulted in sub-epidermal separation and altered orientation of the collagen fibers similar to that seen in patients with pressure ulcers [10].

The most gender that visits government hospitals for the treatment of wound was male in the course of the research with the percentage of 59.3%. This could be due to the reason that most of the male might sustain injury at their place of work due to the fact that male engage in hard jobs than female and also make use of sharp tool more than female at their places of work. This correlate with the report of Mohammed et al. [11] who reported that a total of 137 study participants with wound infection were included in their study, among these 81 (59.1%) were males and 56 (40.9%) were females with the age range of 2 to 80 years and mean age of 31.63 ± 15.39 years.

In the course of the study 31.0% of the respondents that participate in the survey were single while 69% were married. Self-employed had the highest percentage distribution of 27.8% while driver had the lowest percentage of 4.8%. Most of the respondents reside in Akure while Ilara had the lowest respondent patients with wounds that visited hospitals in the course of the study.

Four-point-five percent (4.5%) of the patients with wounds were diagnosed with diabetes and 4.0 percent of the respondents were on diabetes drug, this could delay wound healing process. Diabetic wounds are slow to heal, are difficult to manage, and could last for weeks, thereby posing a serious challenge to manage in a clinical setting [12]. Dinh et al. [13] submitted that recent investigation has also revealed a chronic wound environment with diminished expression of growth factors and cytokines integral to the wound healing process. Altered wound healing is one of the most common complications in Diabetes Mellitus (DM) [14]. The wound healing process in patients with DM is deteriorated due to hyperglycaemic conditions that lead to major chronic complications, such as Diabetic Foot Ulcers (DFUs) [15].

Eighteen-point-three percent (18.3%) of the patients with wounds take alcohol. Patients with

wounds that take alcohol regularly were 16.3% while 2.0% take alcohol occasionally. Trevejo-Nunez [16] reported that alcohol use and misuse have been part of human society for centuries. Clinical evidence and animal experiments have shown that exposure to alcohol impairs wound healing and increases the incidence of infection [17]. Smoking, alcohol and drug dependency can all negatively affect healing [18]. Like any other organ in the human body, the skin is also affected by alcohol intake. Alcoholism is associated with higher rates of wound infection and delay in wound closure [16]. It is associated with increased risk for *Staphylococcus aureus* infection, including methicillin-resistant *Staphylococcus aureus*, *Streptococcus pyogenes*, and *Vibrium vulnificus* [16].

In the course of the survey at government hospitals in Ondo State, 9.3% of the respondent smoke cigarette. Two-point-five percent (2.5%) smoke regularly while 6.8% smoke occasionally. Smokers are exposed to a toxic mix of over 7,000 chemicals when they inhale cigarette smoke [19]. The harmful chemicals in cigarette smoke can damage nearly every organ in the body [19]. Nonsmokers are exposed to many of these same chemicals through secondhand smoke [20]. During smoking carbon monoxide enters into the blood cells and lowers the level of oxygen in the blood. Oxygen is vital to wound healing. Smoking slows the healing process as less oxygen is delivered to the wound. McDaniel and Browning [21] submitted that considering the vast financial, social, and clinical impact of chronic wounds, it is essential that clinicians treating patients with these conditions consider all modifiable factors that may delay wound healing including smoking. Smoking raises blood sugar levels. Heightened blood sugar levels have numerous medical consequences, one of which is a deceleration of the wound healing process. According to Wound Care Centers, high blood sugar, which can be caused by smoking, creates arterial stiffness and narrows the blood vessels. Cigarette smoking negatively impacts wound healing on multiple levels [22,23]. As a result, chronic patients with wounds who continue to smoke should be encouraged to quit and provided tools by healthcare providers to assist with that process [21].

Thirty-six-point five percent (36.5%) of the patients with wounds were on traditional herb. Patients with wounds that take traditional herb were 16.8%, 19.8% take traditional herb

occasionally, while 63.5% of the respondent did not take at all.

None of the patient was diagnosed with obesity. Guo and DiPietro [24] observed that obesity is well-known to increase the risk of many diseases and health conditions, which include coronary heart disease, type 2 diabetes, cancer, hypertension, dyslipidemia, stroke, sleep apnea, respiratory problems, and impaired wound healing. A patient who weighs 20 percent more than his or her ideal body weight has a higher risk of infection leading to an interruption of the healing process [25].

## 5. CONCLUSION

The clinical data such as age, gender, smoking, obesity, occupation, health related issues etc of the patients with wounds that visited hospitals is one the predisposing factor which could lead to microorganisms isolated from the patients wounds to cause systemic infection in immunocompromised patients. Therefore, wound should be cover appropriately by trained personnel in order to avoid microorganism gaining entrance into the blood through wound.

## CONSENT

It is not applicable.

## ETHICAL APPROVAL

Ethical clearance for the collection of wound swab samples from patients attending University of Medical Sciences Teaching Hospital, Akure and Federal Medical Center, Owo was collected from Hospitals Management Board, Akure, Ondo State, Nigeria.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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