ISSN: 2347-5129
IJFAS 2014; 2(1): 134-141

www.fisheriesjournal.com
Received: 03-08-2014
Accepted: 31-08-2014

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Antibiogram of aerobic bacteria isolated from skin lesions of African catfish cultured in Southeast, Nigeria

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Abstract
Aerobic bacteria associated with skin lesions in African catfish cultured in Southeast, Nigeria has not been documented. This study was conducted to identify aerobic bacteria associated with skin lesions of African catfish reared in Southeast Nigeria and to determine the antibiogram of the bacterial isolates. Scrapings from skin lesions of 129 fish from 27 fish ponds in 3 states in Southeast Nigeria were processed for aerobic bacteria isolation and identification following standard methods. Phenotypic resistance of the bacterial isolates to antimicrobial agents was conducted using the disc diffusion method. Skin lesions from 55(67%) of the 129 catfish processed yielded positive culture of *Aeromonas* species. Biochemical tests showed that the *Aeromonas* were motile species – *Aeromonas hydrophila* 48(87%), *Aeromonas caviae* 4(7%) and *Aeromonas sobria* 3(6%). The *Aeromonas* species exhibited highest resistance to ampicillin (100%) followed by tetracycline (89%), chloramphenicol (78%), ceftriaxone (71%), streptomycin (66%), amoxicillin-clavulanic acid (20%) and enrofloxacin (11%). None of the isolate was resistant to gentamicin, amikacin, ciprofloxacin, norfloxacin, ofloxacin, levofloxacin and ceftazidime. Fifty three (96%) of the *Aeromonas* isolates exhibited multidrug resistance. The *Aeromonas* isolates exhibited 23 resistance patterns to the antimicrobial agents tested.

Keywords: African catfish, Skin lesion, *Aeromonas* species, Antibiogram.

1. Introduction
In the diet of Africans, fish and fish products play significant nutritional role owing to higher cost and bias associated with other animal protein sources [1]. Aquaculture, which is dominated by African catfish production, has in recent decade increased at a phenomenal rate in many parts of Nigeria, including Southeast Nigeria [2]. This dominance of African catfish production is related to their aquaculture attributes which include ability to withstand handling stress, disease resistance, high growth rate, fecundity and palatability [3].
Microbial infections constitute one of the major constraints to aquaculture [4, 5]. This is because aquaculture (captivity) results to explosive growth of aerobic microorganisms, which is exacerbated by ban of malachite green as pesticide in aquaculture [5]. Fish skin serves as organ of interaction with its environment and as the first site of attachment for microorganisms [6, 7, 8]. Skin lesions, often induced by attachment of microorganisms to fish skin, affect fish performance and productivity because of the crucial homeostatic functions such as osmoregulation, locomotion, respiration, thermoregulation, mechanical protective function and antimicrobial activities performed by the skin [6, 7]. Farmers and veterinarians usually attempt to treat these infections using different antimicrobial agents. There have been reports of treatment failure, heavy mortalities and losses despite heavy use of antimicrobials; this treatment failure often attributed to development of resistance by the incriminated organisms [2].
Aerobic microorganisms associated with skin lesions have been documented in fish reared in temperate regions, some African countries and Southwest, Nigeria [9, 10, 11, 12]. The reported aerobic microorganisms and specific skin infections which they are associated with include: *Edwardsiella tarda* in edwardsiellosis [13], *Flavobacterium columnare* in columnaris disease [12], *Mycobacterium* species in mycobacteriosis [14], *Aeromonas hydrophila*, *Aeromonas caviae* and *Aeromonas sobria* in motile *Aeromonas* septicaemia [10, 15] and *Aeromonas*

salmonicida in typical furunculosis [10].

Unfortunately, there is paucity of information on aerobic bacteria associated with skin lesions in African catfish raised in Southeast Nigeria, and the antimicrobial resistance profile of the bacterial isolates have not been reported. This study was therefore conducted to identify aerobic bacteria associated with skin lesions of African catfish reared in Southeast Nigeria and determine the antimicrobial resistance profile of the isolates.

2. Materials and methods

2.1 Sampling

African catfish with skin lesions were collected from 27 fish ponds in 3 contiguous states (Enugu, Ebonyi and Anambra) in Southeast, Nigeria between June, 2011 and May, 2012. In each of the states, catfish farms were identified using exponential non-discriminative snowball sampling technique (i.e. the first farmer identified helped to locate others in the locality). Fish ponds/tanks were selected using convenience sampling technique (i.e. ponds/tanks that were accessible to the researcher and whose owners allowed/granted permission for samples to be collected). From each affected pond, five infected or freshly-dead fish were sampled randomly by scooping blindly with a net. Whole freshly-dead fish samples were transported in sterile plastic bags (one fish per bag) using ice packs, whereas, infected live fish were transported in clean plastic water gallons containing freshwater (to ensure oxygenation) in different groups as were collected from ponds/tanks to avoid cross-contamination. The samples were processed within 4 hours of collection in the Veterinary Microbiology Laboratory, Department of Veterinary Pathology and Microbiology, University of Nigeria, Nsukka.

2.2 Isolation and identification of aerobic bacteria

This was done aseptically according to the procedure described by Chirila *et al*. [16]. Skin lesions were disinfected using 70% alcohol in order to remove surface contaminants. A sterile scapel blade was then used to scrape the edge of the lesions. The skin scrapings were cultured primarily on blood agar. Inoculated plates were incubated at 37 ^{o}C for 24 to 48 hours aerobically and observed for growth. Purification of the cultures was done using nutrient agar. The cultural/colonial characteristics were appropriately described and recorded. Pure cultures of the isolates were then inoculated onto nutrient agar slants, incubated at 37 ^{o}C for 24 and up to 48 hours and maintained at 4 ^{o}C until needed for further analysis. Phenotypic characterization of the isolates was done by subjecting them to various tests such as Gram staining, motility, cultural kinetics, salt tolerance, haemolysis, oxidase, catalase, urease, methyl-red, indole, and sugar (glucose, lactose, arabinose, rhamnose, maltose, xylose, sucrose, mannitol, inositol and sorbitol) fermentation following standard biochemical methods.

2.3 Determination of antibiogram of bacterial isolates

Antibiotic susceptibility of the bacteria isolates was determined by the disc diffusion method [17]. The isolates were sub-cultured on nutrient agar, incubated at 37 ^{0}C for 24 hours. Then colonies of each of the isolate were adjusted to 0.5 McFarland's turbidity standard (equivalent to $1x10^{8}$ colony forming unit/ml) in sterile phosphate buffered saline (PBS). The standardized broth cultures were incubated for 10 minutes at 37 ^{o}C and then inoculated on sterile Mueller-Hinton agar plates.

Fourteen antibiotics (Oxoid®) were used and they included: gentamicin (10 µg), streptomycin (10 µg), amikacin (30 µg), ciprofloxacin (5 µg), norfloxacin (10 µg), levofloxacin (5 µg), enrofloxacin (5 µg), ofloxacin (5 µg), ampicillin (10 µg), amoxicillin-clavulanic acid (20/10 µg), ceftazidime (30 µg), ceftriaxone (30 µg), tetracycline (30 µg) and chloramphenicol (30 µg). Seven discs were placed strategically on each of the inoculated Mueller-Hinton agar plate. The plates were incubated at 37 ^{o}C for 18 hours. After incubation the zone of inhibition around each disc was measured with a meter rule. Each test was performed in triplicate and the mean inhibitory zone diameter (IZD), calculated to the nearest whole millimeters for each isolate and each antibiotic. The mean IZD was interpreted as susceptible, intermediate-susceptibility or resistant according to the Clinical and Laboratory Standards Institute (CLSI) [18] criteria for aerobic bacteria. For the purpose of the study, isolates with intermediate-susceptibility were classified as resistant.

3. Results

3.1 Aerobic bacteria from skin of catfish

Skin lesions from 129 African catfish were processed for isolation and identification of aerobic bacteria. The lesions were either erosive (Figure 1) or ulcerative (Figure 2) in nature.

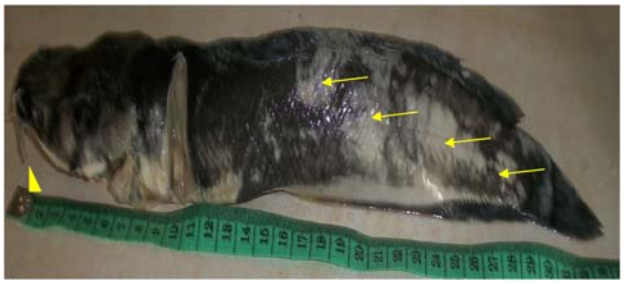

Fig 1: Erosive skin lesions in naturally-infected African catfish (arrows). Also observe rotten barbell (arrow head)

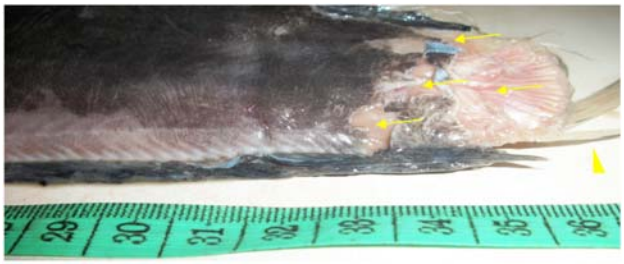

Fig 2: Ulcerative skin lesions in naturally infected African catfish (arrows). Also observe tail fin rot with remnant (arrow head)

Out of the 129 African catfish with skin lesions, 55(67%) gave positive culture for bacteria. All the bacterial isolates belonged to the genus *Aeromonas* (Table 1). On the basis of the biochemical reactions, the *Aeromonas* were identified into 3 species namely *A. hydrophila* (n = 48; 87%), *A. caviae* (n = 4; 7%) and *A. sobria* (n = 3; 6%) (Table 2).

Table 1: Isolation rate of aerobic bacteria from skin lesions in different locations

Location	Number of fish processed	Number (%) of positive culture	Number (%) of *Aeromonas* isolates
Anambra	60	42	21(38)
Enugu	44	28	24(44)
Ebonyi	25	12	10(18)
Total	129	82	55(100)

Table 2: Phenotypic reactions of *Aeromonas* species from skin lesions in African catfish

Characteristics	Percentage of *Aeromonas* strains that exhibited reaction		
	A. hydrophila (n = 48)	***A. caviae (n = 4)***	***A. sobria (n = 3)***
Motility	48(100	4(100)	3(100)
Oxidase production	48(100)	4(100)	3(100)
Catalase production	48(100)	4(100)	3(100)
Urease production	0(0)	0(0)	0(0)
Citrate utilization	48(100)	4(100)	3(100)
Beta haemolysis	48(100)	2(50)	1(33)
Gamma haemolysis	0(0)	2(50)	2(67)
Growth at:	48(100)	4(100)	3(100)
4 ºC	48(100)	4(100)	3(100)
25 ºC	48(100)	4(100)	3(100)
37 ºC	48(100)	4(100)	3(100)
Growth on salt agar:			
5%	48(100)	4(100)	3(100)
7.5%	0(0)	0(0)	0(0)
Indole	48(100)	4(100)	3(100)
Methyl red	48(100)	4(100)	3(100)
On triple sugar iron agar:			
Gas production	4(8)	0(0)	0(0)
Hydrogen sulphide production	0(0)	0(0)	3(100)
Fermentation of:			
Glucose	48(100)	4(100)	3(100)
Lactose	0(0)	0(0)	0(0)
Arabinose	46(97)	4(100)	3(100)
Rhamnose	45(94)	0(0)	0(0)
Maltose	48(100)	4(100)	3(100)
Xylose	0(0)	4(100)	0(0)
Sucrose	48(100)	4(100)	3(100)
Mannitol	48(100)	4(100)	3(100)
Inositol	48(100)	4(100)	0(0)
Sorbitol	0(0)	0(0)	0(0)

Table 3: Antibiogram of *Aeromonas* species from skin lesions in African catfish

		Number (Percentage) ***n = 55***	
Antibiotics	**Disk content (µg)**	**Resistant**	**Susceptible**
Gentamicin	10	0(0)	55(100)
Streptomycin	10	36(66)	19(34)
Amikacin	30	0(0)	55(100)
Ciprofloxacin	5	0(0)	55(100)
Norfloxacin	10	0(0)	55(100)
Ofloxacin	5	0(0)	55(100)
Enrofloxacin	5	6(11)	49(89)
Levofloxacin	5	0(0)	55(100)
Ampicillin	10	55(100)	0(0)
Amoxicillin-clavulanic acid	20/10	11(20)	44(80)
Ceftriaxone	30	39(71)	16(29)
Ceftazidime	30	0(0)	55(100)
Tetracycline	30	49(89)	6(11)
Chloramphenicol	30	43(78)	12(22)

3.2 Antibiogram

All (100%) the *Aeromonas* strains were susceptible to gentamicin, amikacin, ciprofloxacin, norfloxacin, ofloxacin, levofloxacin and ceftazidime (Table 3). Thirty six (66%) of the isolates were resistant to streptomycin, 6(11%) to enrofloxacin, 55(100%) to ampicillin, 11(20%) to amoxicillin-clavulanic acid, 39(71%) to ceftriaxone, 39(71%) to tetracycline and 43(78%) to chloramphenicol.

Thirty six (75%) of *A. hydrophila* strain were resistant to streptomycin while none (0%) of *A. caviae* and *A. sobria* strains were resistant to this antibacterial agent. Four (8%) of *A. hydrophila*, and 2(67%) of *A. sobria* strains were resistant to enrofloxacin. Thirty five (73%), 3(75%) and 1(33%) of *A. hydrophila*, *A. caviae* and *A. sobria*, respectively, were resistant to ceftriaxone. Similarly, 40(83%), 4(100%) and 3(100%) of the strains were resistant to tetracycline, while 39(81%), 3(75%) and 1(33%) of the strains respectively were resistant to chloramphenicol.

Out of 55 *Aeromonas* isolates, 15(27%) were resistant to 2 classes of the 14 tested antibiotics, 25(46%) to 3 classes, and 11(20%) to 4 classes (Table 4). A total of 51 (93%) of the *Aeromonas* isolates were resistant to 2 or more of the tested antibacterial agents. The *Aeromonas* species exhibited 23 resistance patterns with AMP-CTX-C-TE and S-AMP-CTX-TE being the most prevalent patterns (Table 5).

Table 4: Number of antibacterial classes to which isolates were resistant to

Number of antibiotic class	Number (Percentage) resistant
1	4(7)
2	15(27)
3	25(46)
4	11(20)
Total	55(100)

Table 5: Frequency of resistance pattern exhibited by skin lesion *Aeromonas* species

S. N	Resistance Pattern	Frequency	Percentage of the isolates
1.	S-AMP-CTX-TE	7	13
2.	AMP-CTX	2	4
3.	S-C-TE	1	2
4.	S-AMP-C-TE	1	4
5.	S-ENR-AMP-TE	2	2
6.	ENR-AMP	1	2
7.	AMP-C	1	2
8.	AMP-CTX-C-TE	1	15
9.	AMP-C-TE	8	2
10.	AMP-AMC-CTX-C-TE	1	4
11.	AMP-CTX-TE	2	7
12.	S-AMP-AMC-CTX-C-TE	4	2
13.	S-ENR-AMP-AMC-TE	1	2
14.	AMP-AMC	1	2
15.	AMP-AMC-CTX-TE	1	7
16.	AMP-TE	4	5
17.	ENR-AMP-CTX-C-TE	3	5
18.	S-AMP-AMC-CTX-TE	3	5
19.	AMP	3	4
20.	S-AMP-TE	2	5
21.	S-AMP-CTX-C	3	2
22.	S-AMP-CTX-C-TE	1	4
23.	S-AMP-CTX	1	2
	Total	55	100

S = Streptomycin, TE = Tetracycline, C = Chloramphenicol, AMP = Ampicillin, ENR = Enrofloxacin, CTX = Ceftriaxone, AMC = Amoxicillin-clavulanic acid

4. Discussion

Clinical signs such as lethargy, sluggish "head-up-tail-down" swimming, and rubbing of body against tank/pond wall were observed from the African catfish during sampling indicating that they were diseased. The erosive and ulcerative lesions observed on the fish skin indicated that the fish had skin infections. The lesions were similar to lesions reported in cases of motile *Aeromonas* septicaemia in catfish farms in Canada[19], Iran [20] and Egypt [21], and in common carp (*Cyprinus* species) farms in India [15]. The collection of 129 African catfish with skin lesions from 27 tanks/ponds in the 3 studied states, may suggest high incidence of skin lesions in African catfish cultured in Southeast Nigeria. This may be a major cause of considerable economic loss in aquaculture in this part of Nigeria. suggest that these organisms are associated with skin lesions of African catfish in Southeast Nigeria. Isolation of aerobic bacteria in skin lesions of 55(67%) of fish Other researchers have also reported isolation of aerobic bacteria from skin lesions of fish such as in cultured *Tilapia mossambica* in Malaysia [22], in farmed *Cyprinus*

carpio in Syria [23] and cultured catfish in Southwest Nigeria [11]. The skin lesions in fish that gave negative cultures may have resulted from mechanical injury following fighting and/or mishandling [24]. The highest isolation (44%) of aerobic bacteria was obtained from fish collected in Enugu state. This may suggest that these aerobic bacterial organisms are associated with skin lesions more in catfish reared in the state than the other states. Isolation of Gram-negative coccobacilli from the skin lesion samples corroborates the report of Yanong [25] that most skin lesion-causing organisms in freshwater fish are Gram-negative bacteria. The isolated aerobic bacteria could have caused the skin lesions following immunosuppression of the fish or they could also have contaminated wounds following mechanical injury. *Aeromonas* species have been reported to occur as commensals on fish skin where they cause opportunistic infections following immunosuppression [26].

The results of phenotypic characterization of the *Aeromonas* species showed that the isolates were motile species - *Aeromonas hydrophila*, *Aeromonas caviae* and *Aeromonas sobria* strains. This finding further suggests that the lesions resulted from motile *Aeromonas* septicaemia [7, 15]. These motile *Aeromonas* strains have been reported to be widely distributed in the aquatic environment and fish [26, 27] and the results obtained in the present study support these findings.

The fact that the *Aeromonas* species produced catalase and oxidase showed that they are aerobic organisms. Oxidase is an enzyme produced by bacterial organisms which utilizes oxygen as the final electron acceptor, while catalase is a virulent enzyme produced by bacterial organisms which breaks down hydrogen peroxide (H_2O_2) produced during aerobic respiration by both the organism and the host's phagocytic cells [28]. *Aeromonas* species have been widely reported to produce these enzymes [26, 29].

The present study also revealed that 100% of *A. hydrophila*, 50% of *A. caviae* and 33% of *A. sobria* exhibited beta hemolytic activity. Beta hemolysin has been reported as a virulence factor in motile aeromonads [30]. The finding in this present study agrees with the report of Hatha *et al*. [27] that not all motile aeromonads produce beta haemolysin. However, it contrasts the report of Minnana-Galbis *et al*. [31] where 100% of the 3 motile aeromonads were beta haemolytic. The cultural kinetics (ability to grow at 4 ^{0}C and 37 ^{0}C) may suggest a kind of adaptability of the *Aeromonas* isolates to both poikilothermic and homoeothermic environment. This adaptation is crucial for these organisms to establish infections in African catfish cultured in tropical poikilothermic environment [32]. Motile *Aeromonas* strains have been incriminated in several diseases of homeotherms [26]. Similarly, the sugar fermentation test suggest ability of the *Aeromonas* strains especially *A. hydrophila* (which fermented 7 out of 10 tested sugars) to adapt to varying environments. This may also explain higher isolation of *A. hydrophila* from the samples. Identification of 3(6%) of the *Aeromonas* isolates as *A. sobria* was based on their ability to produce hydrogen sulphide on triple sugar iron agar (TSI). Daood [23] reported that among motile *Aeromonas* species, only *A. sobria* can produce hydrogen sulphide on TSI. The rest of the phenotypic characteristics exhibited by *Aeromonas* species isolated in this present study, were consistent with the reports of other researchers [23, 27, 26, 33]. *Aeromonas hydrophila* was the dominant species (87%) in the skin lesions of the African catfish followed by *A. caviae* (7%) and *A. sobria* (6%). This suggests greater pathogenic potential of *A. hydrophila* than *A. caviae* and *A. sobria* [23, 34]. The 87% isolation rate for *A. hydrophila* in the present study is lower than 100% reported for skin lesions from cultured *Tilapia mossambica* in Malaysia [22], but it is comparable to 90% reported for skin lesions of ornamental fish in Thailand [35]. However, the result is higher than 33.58% reported by Vivekanandhan *et al*. [36] from intestine of farmed fish in South India; 52.3% reported by Daood [23] from skin of cultured carp in Syria, and 70% reported by Hatha *et al*. [27] from intestine of farmed fish in East India.

The results of antibiogram revealed high rate (100%) of resistance by the *Aeromonas* strains to ampicillin. Motile *Aeromonas* strains have been reported to be inherently resistant to ampicillin [23, 27, 26]. This inherent resistance may explain the high rate of resistance of the isolates to the drug recorded in the present study. This result is similar to 100% resistance to ampicillin reported by Son *et al*. [22], Hatha *et al*. [27], Erdem *et al*. [33] and Daood [23] among motile *Aeromonas* isolates from skin lesions of cultured *Tilapia* in Malaysia, intestine of farmed fish in India, marketed meat in Turkey and skin of catfish in Syria, respectively. However, Jongjareanjai *et al*. [35] reported 83.33% resistance to ampicillin among *A. hydrophila* isolates from skin lesions of ornamental fish in Thailand. Resistance of the isolates to ampicillin may have been mediated by production of beta-lactamase enzymes which is a common mechanism of beta-lactam resistance in Gram-negative bacteria [37, 38]. This may also explain the low rate (20%) of resistance of the isolates to amoxicillin-clavulanic acid. Clavulanic acid is a beta-lactamase inhibitor and therefore may have inhibited the beta-lactamase produced by the isolates [39], resulting in an increase susceptibility of the *Aeromonas* species to amoxicillin/clavulanic acid combination.

High rate (89%) of resistance was also encountered against tetracycline. Tetracycline is a broad-spectrum antibiotic frequently used in aquaculture operations in Nigeria in order to treat various diseases [2]. This may have resulted to a high degree of selection for resistant strains [27]. Resistance to tetracycline recorded in this study is comparable to the findings of Jongjareanjai *et al*. [35] and Dias *et al*. [40] who reported 81.8 and 80% resistance among *Aeromonas* isolates obtained from skin lesions of ornamental fish in Thailand and Portugal, respectively. It is higher than 40 and 53.1% reported by Hatha *et al*. [27] and Daood [23] among motile *Aeromonas* isolates from the intestine of farmed fish and organs of common carp in India and Syria, respectively. Resistance rate exhibited by *Aeromonas* in this study is also higher than 52 and 69% reported by Schmidt *et al*. [41] and Su *et al*. [42] among *Aeromonas* and Enterobacteriaceae isolates from catfish farms in Holland and China, respectively. Since ampicillin and tetracycline are extensively used in livestock husbandry in Nigeria [2, 43], it is possible that animal manure containing organisms resistant to these antibiotics were used to fertilize the pond water resulting in transfer of resistance genes to the *Aeromonas* strains. Tetracycline has been reported to enhance the production of plasmid-mediated resistance in aquatic bacteria resulting in increased frequency of new tetracycline-resistant isolates [44].

The fact that none of the *Aeromonas* strains encountered in this study was resistant to gentamicin, amikacin, ciprofloxacin, norfloxacin, levofloxacin and ofloxacin, and only 6(11%) were resistant to enrofloxacin may be as a result of infrequent use of these drugs in aquaculture.

Resistance of the *Aeromonas* strains to gentamicin was reported to be 4.7% and 10% reported by Daood [23] and Hatha *et al*. [27], respectively. Vivekandahan *et al*. [36], Hatha *et al*. [27], Jongjareanjai *et al*. [35] and Dias *et al*. [40] found 9.3%, 10%, 36% and 49.3%, respectively, of *Aeromonas* strains resistant to ciprofloxacin. Similarly, Jongjareanjai *et al*. [35] found 46% of *A. hydrophila* isolates from catfish in Thailand resistant to norfloxacin. The authors also reported 52% resistance to enrofloxacin which is higher than the 11% recorded in this study. This low resistance rates to these drugs in this study suggests that they are not used in aquaculture in Southeast Nigeria.

In this present study, 71% of the *Aeromonas* isolates were resistant to ceftriaxone. This observation is higher than the finding of Hatha *et al*. [27] who reported 40.7% of motile *Aeromonas* resistant to ceftriaxone. This antibiotic is a third-generation oxyimino-cephalosporin whose resistance is mediated by extended-spectrum beta-lactamases (ESBLs). Therefore, this may further explain the multiple drug resistances among isolates obtained in this study, since ESBLs encodes for resistance against other classes of antibiotics [36]. The 78% resistance to chloramphenicol is higher than 5.0% [36], 8.0% [23] and 40.7% [27] reported for *A. hydrophila* strains in marketed fish, and motile *Aeromonas* strains from common carp and farmed fish, respectively. Variation in resistance rates may be due to differences in antibacterial use pattern resulting in differences in antibiotic selection pressure. This is significant as the detection of chloramphenicol residues in aquaculture products has raised concern within the international community and has resulted in a ban on the products from some suppliers [27].

In terms of resistance to classes of antibacterial agents, 51(93%) were resistant to 2 or more classes implying multidrug resistance. Resistance to four or more of the antibacterial agent was exhibited by 11(20%) of the isolates. This multidrug resistance exhibited by the isolates could have resulted from acquisition of multidrug resistance genes from other microbes in the environment since the aquaculture is often loaded with microbes [42]. It is also possible that these drugs have been used to prevent or treat infections in these farms. Olatoye and Basiru [2] reported that 100% of catfish farmers in Ibadan Southwest, Nigeria routinely administer several antimicrobial agents to their fish for disease prevention, treatment and productivity performance. This indiscriminate practice may not be different among catfish farmers in Southeast Nigeria.

5. Conclusion

This study has shown that skin lesions could be a major cause of considerable economic loss to African catfish farmers in Southeast Nigeria. Three motile *Aeromonas* strains (*Aeromonas hydrophila*, *Aeromonas caviae* and *Aeromonas sobria*) were bacterial agents associated with skin lesions in African catfish raised in Southeast Nigeria; with *Aeromonas hydrophila* being the most prevalent species. The skin lesions were erosive or haemorrhagic ulcerative in nature. *Aeromonas* isolates from the skin lesions have developed multidrug resistance to antibiotics probably due to indiscriminate use in animal husbandry and aquaculture. Isolation and identification of causative agent and determination of the antimicrobial profile of bacterial agents associated with skin lesions is necessary for effective antimicrobial treatment.

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