(RESEARCH ARTICLE)

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Assessment of some haematological parameters among commercial fishermen in Amassoma Bayelsa State Nigeria

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Abstract

Fishing is an occupation that is stressful, thus can affect human health in diverse ways. This study assessed some haematological parameters among commercial fishermen in Amassoma, Bayelsa State, Nigeria. With the aid of a venipuncture technique, 5ml blood sample was collected from each of the eighty one participants used for this study who were subsequently categorized into three groups: experimental group one made up of twenty seven fishermen with < 5 years fishing experience and within the age range of 24 .and 37 years, experimental group two made up of twenty seven fishermen with 5-10 years fishing experience and within the age range of 24 and 37 years and non-fishermen within the age range of 24 to 37 years who represented the control group. The blood samples were dispensed into ethylene-diamine-tetra-acetic acid anti-coagulated bottles respectively and used to measure packed cells volume (micro-haematocrit method), haemoglobin (automation method), total white blood cells (improved neubauer method)and erythrocytes sedimentation rate (westergren method).After these measurements the obtained data were analyzed employing the SPSS 23.0 version as statistical package while the differences between the groups which were considered significant at a p-value lesser than 0.05 were assessed using student "t" test. The results in experimental group one fishermen revealed no statistically significant differences in the mean values of packed cells volume (p=0.71), haemoglobin (p=0.68), and erythrocytes sedimentation rate (p=0.74) while that of total white blood cells revealed significant elevation (p=0.03) as compared to the control group. Meanwhile, the mean values of packed cells volume (p=0.02) and haemoglobin (p=0.02) revealed significant decrease while total white blood cells count (p=0.01) and erythrocytes sedimentation rate (p=0.02) revealed significant elevation in the experimental group two participants when compared to the control group. This study therefore concludes that commercial fishing for a period of 5-10 years has adverse effect on health. These fishermen are therefore recommended to go for routine medical check- up of these measured haematological parameters

1. Introduction

Fishing is one of the oldest occupations and a food source besides source of income and livelihood for millions of people globally. The Food and Agriculture Organisation defines this industry as comprising multiple sectors, including (i) commercial, which entails fishing for profit making (ii) artisan (subsistence or traditional) which entails fishing for food as well as survival and often in small scale and (iii) recreational which is mainly for pleasure or sport, often using rod – and –reel gear [1].

The commercial sector is dedicated to supplying fish and seafood products for human consumption or as inputs in diverse industrial processes, involving enterprises and individuals engaged in wild catch or aquaculture, along with the

various transformations of these resources into marketable products. More than 500 million people in developing countries depend, directly or indirectly, on fisheries and aquaculture for their livelihoods [2].

The artisan fishing may be undertaken for both commercial and subsistence objectives. This strategy significantly differs from extensive modern commercial fishing tactics, as it is generally less wasteful and imposes reduced stress on fish populations relative to current industrial fishing techniques [3]. A considerable portion of the global population relies on artisanal fisheries for their sustenance. This fishing is crucially important for sustenance, employment, revenue, nutrition, food security, sustainable livelihoods, and poverty reduction. It reflects the performance of fisheries in tropical developing nations, including Nigeria.

The recreational sector encompasses organisations and persons involved in activities pertaining to recreation, sports, or the use of fisheries resources, yielding items not intended for commercial sale. Stress affects multiple biochemical regulatory systems and is acknowledged as a major risk factor for various diseases [4]. The organism's non-specific reaction to fluctuating surroundings has been defined as such [5]. Organisms often face detrimental environmental conditions including cold, heat, and ultraviolet stress.

The fishing industry provides a substantial quantity of food to various countries worldwide; which makes the participants in this industry often operate far into the ocean under arduous conditions. This industry encounters substantial obstacles pertaining to environmental and welfare issues, including overfishing and workplace safety [6]. This occupation which is hazardous and serves as an important aspect of human societies for more than thousands of years dating back to ancient civilizations exposes fishermen to several physical, chemical and biological risks [7]. Fishermen are prone to illnesses, injuries and fatalities which are caused by accidents, harsh weather conditions and equipment related [8]. Few studies have reported increased rate of disorders involving musculoskeletal, hearing and skin among fishermen [9].

Fishing as an occupation exposes fishermen to hazardous chemicals such as pesticides, polyaromatic hydrocarbons and heavy metals, and this is via contact with contaminated water, fish or equipment [10]. These exposures which are hazardous have been linked to numerous health issues such as cancer, neurological damage and reproductive problems [11]. However, this industry is known to face a lot of challenges with fishermen experiencing some haematological changes such as alterations in white blood cells count, red blood cells count, haemoglobin levels etc which are attributed to chemical exposures, infections or nutritional deficiencies [12].

Given the findings of various researchers regarding the cold stress experienced by fishermen, couple with significant alterations of haematological parameters as reported in fishermen as well as lack of understanding of their health issues [13], it is imperative to conduct this study which focused on the assessment of some haematological parameters among commercial fishermen in Amassoma, Bayelsa State, Nigeria

2. Materials and methods

2.1 Scope of the experiment

The research was carried out in Amassoma with a total population of 352, 285 according to 2006 census. This town is situated in Latitude 4° 55/ 36.30/ North and Longitude 6° 16/ 3.50/ East with an area of 1,696 km^2 [14, 15].

2.2 Ethical Approval

Informed consent was obtained from all the participants who were made to know why their blood specimens were needed for this research. Thereafter the study was embarked on in compliance with the principle of Helsinki declaration of 1975 as revised in 2008

2.3 Study population

The study population consisted of eighty-one apparently healthy participants who were subsequently grouped into three as shown:

2.3.1 Control group

The group consisted of twenty-seven participants, who in addition of being apparently healthy were within the age bracket of 24 to 37 years, and are not fishermen.

2.3.2 Experimental group one

This group comprised twenty-seven apparently healthy participants of age range 24 to 37 years who had participated in fishing as an occupation for a period of less than 5 years

2.3.3 Experimental group two

The group comprised twenty apparently healthy participants who were within the age range of 24 to 37 years. These participants have been in active fishing as an occupation for a period of 5 to 10 years

2.4 Selection criteria

2.4.1 Criteria for inclusion

All participants deemed healthy for this study exhibited no health issues.

2.4.2 Criteria for exclusion

Participants with addictions to drugs, snuff, and cigarette smoking were not included in this study.

2.5 Determining the appropriate sample size

The Taro Yamane's method was used as modified by [16].

$n = N/1 + N (e)^2$

n = Sample size
N = Population study
e = Margin of error (0.05)

$n = 30 / 1 + 30 (0.05)^2$

$n = 30 / 1 + 30 (0.0025)$

$n = 30 / 1 + 0.075$

$n = 30 / 1.075$

$n = 27.91$

2.6 Sample collection and processing

Five millilitres of blood samples were collected from each of the apparently healthy participant in both the control and experimental groups via a venipuncture technique. These samples were dispensed into different ethylene diamine tetra acetic acid (EDTA) anticoagulated bottles and mixed carefully so as to prevent clotting. Thereafter, the blood samples were then used for the quantitative measurement of haematological parameters such as packed cells volume, haemoglobin, white blood cells, and erythrocytes sedimentation rate

2.7 Measurement of haematological parameters

Packed cells volume

The microhaematocrit method as described by the International Council for Standardization in Haematology 1980 and modified by [17] was utilized

Haemoglobin

The automated Haematology Analyzer method as described by the Clinical and Laboratory Standards Institute, 2018 and modified by [17] was used

Total white blood cells count

The improved neubauer chamber method as described in Textbook of Medical Laboratory Technology by Baker et al (1995) and modified by [18] was adopted

Erythrocytes sedimentation rate

The westergren method described by Westergren in 1921 and modified [19] was used

2.8 Statistical analysis

The data obtained from this research were grouped into control and experimental, utilising SPSS version 23.0 as the statistical software for analysis. Thereafter, the means and standard deviations of the data were calculated using the student "t" test, with an establishment of a p-value < 0.05 among the groups as being statistically significant.

3. Results

A comparison was made between the measured packed cell volume, haemoglobin, total white blood cell and erythrocytes sedimentation rate in the control group and experimental group one (under 5 years). The findings are captured in Table 1.

Table 1 Mean ± SD values of packed cell volume, haemoglobin, total white blood cell and erythrocytes sedimentation rate measured in the control group compared to those in experimental group one (under 5 years)

Parameters	Control group (n= 27)	Experimental group (n= 27)	p-value	Remark
PCV (%)	40.00 ± 0.21	39.00 ± 0.19	0.71	NS
Hb (g/dl)	13.28 ± 0.07	12.90 ± 0.06	0.68	NS
WBC (cmm)	8,000 ± 1.14	9,500 ± 1.27	0.03	S
ESR (mm/Hour)	5.00 ± 0.31	5.50 ± 0.32	0.74	NS

KEYS: PCV=Packed cells volume, Hb= Haemoglobin, WBC=Total white blood cells count, ESR=Erythrocytes sedimentation rate, S=Statistically significant, NS=Not statistically significant, n=Number of participants.

The results revealed that with the exception of total white blood cells count, the mean values of packed cells volume, haemoglobin and erythrocytes sedimentation rate were not significantly altered.

Table 2 shows the results of the measured packed cells volume, haemoglobin, total white blood cells count and erythrocytes sedimentation rate in the control group as compared to those in the experimental group two (5-10 years).

Table 2 Mean ± SD values of packed cell volume, haemoglobin, total white blood cell and erythrocytes sedimentation rate measured in the control group compared to those in experimental group two (5-10 years)

Parameters	Control group (n= 27)	Experimental group (n= 27)	p-value	Remark
PCV (%)	40.00 ± 0.21	32.00 ± 0.08	0.02	S
Hb (g/dl)	13.28 ± 0.07	10.42 ± 0.04	0.02	S
WBC (cmm)	8,000 ± 1.14	13,000 ± 1.53	0.01	S
ESR (mm/Hour)	5.00 ± 0.31	8.00 ± 0.51	0.02	S

KEYS: PCV=Packed cells volume, Hb= Haemoglobin, WBC=Total white blood cells count, ESR=Erythrocytes sedimentation rate, S=Statistically significant, n=Number of participants.

The results revealed that all the measured haematological parameters were significantly altered with packed cells volume and haemoglobin showing a decrease in mean values as compared to that of the control group while total white blood cells and erythrocytes sedimentation rate showing elevated mean values as compared to the control group

4. Discussion

In this study, we compared the mean values of commercial fishermen with less than 5 years (experimental group one) as well as between 5-10 years (experimental group two) to the control group which consisted of non - commercial fishermen as shown in Tables 1 and 2 respectively.

As shown in Table 1, (experimental group one individuals) the mean value of packed cells volume (p=0.71) revealed no significant alterations as compared to that of the control group. This finding which disagrees with the previous work of [20] indicates that fishing for a period of less than five years has no adverse effect on this haematological parameter.

As shown in Table 1, (experimental group one individuals) the mean value of haemoglobin (p=0.68) revealed no significant alterations when compared to that of the control group. This finding which disagrees with the previous work of [20] indicates that fishing for a period of less than five years has no adverse effect on this haematological parameter.

As shown in Table 1(experimental group one individuals) the mean value of total white blood cells counts (p= 0.03) revealed significant elevation in comparison to that of the control group. This finding which may be associated with the exposure of these fishermen to various hazardous substances such as pesticides, toxic heavy metals, toxic gases etc during fishing and a pointer to infection is as established in this study since there are scarcity of relevant literatures to compare this finding with

As shown in Table 1, (experimental group one individuals) the mean value of erythrocytes sedimentation rate (p=0.74) was not statistically significant when compared to that of the control group. A finding which is as established in this study based on the fact that there are scarcity of relevant literatures to compare our finding with, is indicative of no inflammation in this group of fishermen and has therefore gone a long way to reveal that fishing for a period of less than five years has no adverse effect on this haematological parameter

As shown in Table 2, (experimental group two) fishermen, the mean value of packed cells volume revealed significant decrease (p=0.02) as compared to that of the control group. This finding which is indicative of anaemia and could be associated with their exposure to various toxic gases such as hydrogen sulphide, methane etc, heavy metals such as lead, mercury etc and chemical contaminants such as pesticides, polycyclic aromatic hydrocarbons etc during fishing is in alignment with the past work of [21].

The mean value of haemoglobin in this category of fishermen which also revealed a significant decrease (p=0.02) when compared to that of the control group serves as a pointer to anaemia. The finding however is in conformity with the earlier work of [21].

The mean value of total white blood cells counts in this group of fishermen revealed significant elevation (p=0.01) as compared to that of the control group. This finding which is a pointer to infection is as established in this study.

The mean value of erythrocytes sedimentation rate revealed significant elevation (p=0.02) as compared with that of the control group. This finding which is as established in this study is indicative of inflammatory disorder among this category of fishermen as limited information is available to compare our study with

5. Conclusion

Based on the various findings from this research work, it is concluded that fishing as an occupation for a period of 5-10 years triggers anaemia, infection and inflammation.

Besides, this study which has unveiled the deleterious effects of 5-10 years fishing on human health would increase the knowledge of the public particularly fishermen on the health implications of this occupation.

It is therefore necessary to make the following recommendations:

Commercial fishermen with fishing experience between 5-10 years should periodically undergo medical laboratory tests such as packed cells volume, haemoglobin, white blood cells count and erythrocytes sedimentation rate

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of ethical approval

This study was conducted in accordance with the principles outlined in the Helsinki Declaration of 1975, as revised in 2008 after obtaining oral approval from the leaders of the fishing association in this community.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

Contribution to knowledge

Fishermen would be further enlightened on the health implications associated with commercial fishing for a period of 5-10 years and the need to embark on some precautionary steps while fishing

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