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Occupational Hazards, Health Problems and Peak Expiratory Flow Rates [Pefr] of Local Gari Processors in a Rural Community in South-South, Nigeria

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Abstract

Background: The processing of cassava into Gari comes with a lot of environmental as well as occupational hazards to the processors, and even the consumers. This study aimed at describing the occupational hazards, health problems and peak expiratory flow rate [PEFR] of local gari processors in a rural community in Nigeria.

Methods: This descriptive cross-sectional study was carried out in Oghara, Delta State and data were collected using pre-tested semi-structured questionnaires. Utilizing the multi-stage sampling technique, 400 questionnaires were administered to the gari processors who consented. The Peak Flow Meter was used to determine the respiratory status of respondents. Data were analyzed using the statistical package for social sciences (SPSS) version 16.

Results: The mean age of the respondents was 27.6 ± 13.2 years and they were mostly females (237, 59.2%). Majority (265, 66.2%) of respondents were aware of hazards in Gari processing and the factors significantly associated with awareness among the respondents were age (p=0.021), sex (p=0.010) and educational level (p=0.017). Majority (241, 60.2%) was not aware of protective measures against the hazards they face at work and also more than two-thirds of the respondents had never used personal protective devices. Cuts (338, 84.5%) and puncture wounds (294, 73.5%) were the most common injuries sustained by respondents. Also (273, 68.2%) has ever sustained injuries while frying/roasting gari. The Mean Peak Expiratory Flow for respondents was 304.4 ± 72.5L/min. Bivariate analysis showed no significant association between PEFR and age, sex and duration of involvement in Gari processing.

Conclusion: The study revealed high level of awareness about occupational hazards but poor occupational safety practices among the respondents. There was a high prevalence of injuries among the respondents and their mean Peak Expiratory Flow rate was below normal. Health education of this group of workers about hazards and occupational safety practices is strongly recommended.

Keywords: Occupational hazards; Health problems; Gari processors; Peak Expiratory Flow Rates

Introduction

Gari is a processed fermented product from cassava and is consumed in Nigeria as well as in most countries of the West African coast and in Brazil [1]. Cassava [Manihot esculenta Crantz] is a perennial vegetative propagated shrub and is one of the most important food crops grown in Africa [2]. It is high yielding and drought resistant and with improved pest management practices, its high yielding capacity could be sustained. Cassava is grown for use as food in more than thirty nine African countries [3,4]. Based on the above, cassava has become economically important in several tropical countries where the carbohydrate content of its enlarged root in diversified forms is consumed in most African countries, including Nigeria [4].

Food products from cassava include *gari* [fermented and roasted granules], *fufu* [fermented and steamed cooked], *pupuru* [fermented smoked dried balls and also gelatinized], *lafun* [fermented, sun dried flour and then gelatinized for the table] [4,5]. Cassava has been found to be a great giant that fights hunger and provides earnings for the farmer. Thus, in terms of food security for Nigeria and other African countries cassava has its place. It is then obvious that cassava processing must be given high consideration because of its inseparability from man and animals especially in the developing countries where it is the cheapest food used to combat hunger [4,6].

The processing of cassava into these products mentioned above comes with a lot of environmental as well as occupational hazards to the environment, the processors, and even the consumers [4,5] The safety of the processors, the food products and the environment should be considered in crop processing [4]. Cassava processing activities have both positive and negative effect on the environment. For example, littering of the environment with refuse destroys the freshness, cleanliness and aesthetic value of such environment. The environment responds to this negative effect in form of stenches and microbial load, which may be injurious to man's health [6]. Attendant hazards arising from cassava processing are associated with the

different processing steps that lead to food products obtained from cassava [4].

The different steps include harvesting, peeling, grating, dewatering, fermentation, roasting or drying and finally packaging for sales [7]. The two major wastes generated during cassava processing namely peels and the effluents had been identified to cause high economic damages to vegetation and structures [8]. They also bring about infestation of insects which can later lead to disease-infection in both man and animals. The most widely adopted method (traditional method) of cassava processing has also led to various pathology ranging from general body aches, pains and fatigue, and high body temperature due to smoke in the roasting environment [4,5,9].

Only few studies have however been carried out on the hazards and health problems of local gari processors in Nigeria, and it was hard to come by any such study in Delta State, Nigeria. This study therefore aimed at describing the occupational hazards and health problems of local gari processors in Delta State, Nigeria. It is mandatory in occupational health to carry out periodic medical examination on workers that are exposed to certain hazards peculiar to an occupation. In gari processing, workers are directly or indirectly exposed to fumes from the frying gari among other hazards, therefore this study also carried out ventilator function test to determine the Peak Expiratory Flow Rates (PEFR) in gari processors to determine the effect if any of fumes on their pulmonary function.

Materials and Methods

This descriptive cross sectional study was carried out in Oghara, Delta State. Oghara is a rural community located in Ethiope West Local Government Area [made of two communities–Oghara and Ogharefe] and occupies an area of 1175 km^2.

A minimum sample size of 384 was calculated using Leslie Fisher's formula, but 400 respondents were recruited using multi-stage sampling technique. A semi-structured pretested questionnaire was used to elicit information from respondents by interviewer method. The Peak Flow Meter was also used to determine if there was any respiratory dysfunction associated with Gari processing especially from the fumes/smoke from the frying gari that the processors are exposed to. Those with previous history of chronic respiratory diseases [e.g. Asthma] were excluded from the study. There was no pre-employment medical assessment of the Gari processors to clinically diagnose chronic respiratory diseases before starting work and some of the respondents did not allow research assistants to measure their PEFR hence these constituted limitations to the study. The respondents gave verbal consent before they were selected for the study.

Data were analyzed using the statistical package for social sciences (SPSS) version 16. Frequency tables and cross-tabulations of variables were constructed and p-value set at $p<0.05$.

Results

The mean age of the respondents was 27.6 ± 13.2 years with most of them (243, 60.8%) being below 30 years of age. They were mostly females (237, 59.2%), single (215, 53.8%), Christians (360, 90.0%) and of the Urhobo ethnicity (348, 87.0%) (Table 1).

Variables	Frequency	Percentage
Age groups [in years]	127	31.8
<20	116	29.0
20–29	89	22.2
30–39	35	8.8
40–49	33	8.2
≥ 50	27.6 ± 13.2 years	
Mean Age		
Gender	163	40.8
Male	237	59.2
Female		
Marital status	215	53.8
Single	177	44.2
Married	4	1.0
Divorced	4	1.0
Widowed		
Religion	360	90.0
Christian	17	4.2
Islam	12	3.0
Traditionalist	11	2.8
Others		
Ethnicity	348	87.0

Urhobo Igbo Yoruba	34 18	8.5 4.5
Level of education None Primary Secondary Tertiary	14 162 181 43	3.5 40.5 45.2 10.8

Table 1: Socio-Demographic Characteristics.

Majority of the respondents, 202 (50.5%) were involved in harvesting/transportation and the duration for involvement in Gari processing for the majority (172, 43.0%) was more than 8 years. Gari processing was not the only occupation for most of the respondents (285, 71.2%) and majority of them (279, 69.8%) were involved in Gari processing for commercial purpose. Although many of the respondents, 155 (38.8%) were not sure of their monthly income from Gari processing, the proceeds from Gari processing were not enough for 373 (93.2%) of them to meet their basic needs (Table 2).

Variables	Frequency	Percentage
Role played in Gari processing [multiple Response] Planting/Farming Harvesting/Transport Processing/Peeling Grinding Dewatering Roasting/frying	173 156 202 121 92 58	43.2 39.0 50.5 30.2 23.0 14.5
Duration of involvement [in years] 0-2 3–5 6–8 >8	34 95 99 172	8.5 23.8 24.8 43.0
Other occupation in the last 12 months Yes No	134 266	33.5 66.5
Gari processing as the only occupation Yes No	115 285	28.8 71.2
Gari processing for family consumption only Yes No	121 279	30.2 69.8
Proceeds enough to meet basic needs Yes No	27 373	6.8 93.2
Monthly income from Gari <2,500 2,500–6,999 7,000–9,999 10,000–14,999 ≥ 15,000	53 70 41 38 43 155	13.2 17.5 10.2 9.5 10.8 38.8

Not sure		

Table 2: Respondents' Involvement in Gari Processing.

Variables	Frequency	Percentage
Awareness about hazards in Gari processing[GP]	265	66.2
Yes	135	33.8
No		
Believe that GP is hazardous	294	73.5
Yes	52	13.0
No	54	13.5
Don't know		
Something I do not like about Gari processing	309	77.2
Yes	91	22.8
No		
Aspect I don't like about Gari processing [n=309]	34	11.0
All aspects	51	16.5
Planting/Farming	21	6.8
Harvesting/Transporting	66	21.4
Processing/peeling/grinding/dewatering	137	44.3
Frying/roasting	27	6.8
Ever gone for training on occupational hazards	373	93.2
Yes		
No		

Table 3: Awareness about Hazards in Gari processing among Respondents.

As shown in Table 3, two hundred and sixty five (66.2%) respondents were aware of hazards in Gari processing, while 294 (73.5%) believed Gari processing is hazardous. The factors significantly associated with awareness among the respondents were age (p=0.021), sex (p=0.010) and educational level (p=0.017). Most of them (309, 77.2%) had things they did not like about Gari processing and 137 (44.3%) complained of smoke from the burning firewood used in frying and the smoke from gari during frying. Only 27 (6.8%) had ever gone for training on occupational hazards. Majority of them (241, 60.2%) were not aware of protective measures against the hazards they faced at work and the frequency of usage of protective devices is as shown in Table 4.

Variables	Frequency	Percentage	
Awareness of protective measures against the hazards	159	39.8	
Yes	241	60.2	
No			
Use of Protective devices	Always	Sometimes	Never
Foot wears	303 [75.8]	47 [11.8]	50 [12.5]
Hand gloves	55 [13.8]	48 [12.0]	297 [74.2]
Sun hats/Caps	83 [20.8]	48 [12.0]	269 [67.2]
Overalls	65 [16.2]	64 [16.0]	271 [67.8]
Facemasks	33 [8.2]	27 [6.8]	340 [85.0]

Helmets	13 [3.2]	58 [14.5]	329 [82.2]

Table 4: Awareness and Usage of Personal Protective Equipments [PPE].

Variables	Frequency	Percentage
Injuries ever sustained during GP [multiple Response]	43	10.8
Snakebite	268	67.0
Insect bite	338	84.5
Cuts	294	73.5
Puncture	91	22.8
Fall	139	34.8
Joint pain		
Ever sustained injury while peeling	315	78.8
Yes	85	21.2
No		
Ever sustained injury while Grinding	97	24.2
Yes	303	75.8
No		
Ever sustained injury while Frying/roasting	273	68.2
Yes	127	31.8
No		
Ever been to a health facility for a reason related to this job	45	11.2
Yes	355	88.8
No		
Ever had any of the following	257	64.2
Ringing sound in the ears [tinnitus]	130	32.5
Reduced hearing ability	157	39.2
Headache	160	40.0
Feeling of excessive heat	236	59.0
Skin changes		

Table 5: Injuries and Health Problems of the Gari Processors.

It is shown in Table 5 that Cuts (338, 84.5%) were the most common injuries sustained by respondents during Gari processing, and many had sustained injuries during cassava peeling (315, 78.8%) and frying of the Gari (273, 68.2%). Tinnitus (257, 64.2%) and skin changes (236, 59.0%) were the common health problems experienced by the respondents.

Variable	Awareness of Hazards Yes [%]	Awareness of Hazards No [%]	Df	X2	p-value
Age [in years]	81 [30.6]	46 [34.1]	4	11.560	0.021
Less than 20	82 [30.9]	34 [25.2]			
20-29	57 [21.5]	32 [23.7]			
30–39	17 [6.4]	18 [13.3]			
40–49	28 [10.6]	5 [3.7]			
50 and above					
Sex	96 [36.2]	67 [49.6]	1	6.655	0.010
Male	169 [63.8]	68 [50.4]			

Female					
Educational level None Primary Secondary Tertiary	11 [4.2] 120 [45.3] 106 [40.0] 28 [10.6]	3 [2.2] 42 [31.1] 75 [55.6] 15 [11.1]	3	10.193	0.017
Duration in Gari Processing 1–8 years >8 years	153 [57.7] 112 [42.3]	75 [55.6] 60 [44.4]	1	0.173	0.677
Ever gone for training Yes No	18 [6.8] 247 [93.2]	9 [6.7] 126 [93.3]	1	0.002	0.962

Table 6: Factors associated with Respondents' Awareness of Hazards in Gari Processing.

As shown in Table 6, factors such as age, sex and educational level were all significantly associated with awareness of hazards of gari processing ($p<0.05$) but not with duration in gari processing or ever gone for training ($p>0.05$). The Mean Peak Expiratory Flow Rate for respondents was 304.4 ± 72.5 (n=148). Bivariate analysis showed a significant association between PEFR and involvement in harvesting/transport ($p=0.007$), but not with age, sex, involvement in planting/farming and duration of involvement in Gari processing (Table 7).

Variables	Mean PEF	Standard deviation	p-value
**Age [in years] Less than 20 20-29 30–39 40–49 50 and above	298.1 318.2 309.1 298.3 243.8	75.7 75.4 68.6 58.3 12.5	0.289
*Sex Male Female	311.8 299.7	66.8 76.0	0.322
*Duration of involvement in GP ≤ 8 years >8 years	305.5 302.6	78.3 62.5	0.811

Table 7: Factors associated with Respondents' Peak Expiratory Flow; Mean Peak Expiratory Flow [n=148]=304.4 ± 72.5 L/min.

Discussion

The study showed that three-fifths of the respondents were less than 30 years of age. This finding is similar to what was reported by previous studies [4,5] which generally show that Gari processors are mainly those within the active age group. Nearly 6 out of 10 of the respondents were females, which is consistent with the findings of other authors who also report more females than males in Gari Processing [4,5,10]. This finding corroborates the fact that rural women play a very important role in the economy of the family and the country especially at the grass root level [4,10].

Two-thirds of the respondents were aware of hazards associated with Gari processing and nearly three-quarters believe that Gari processing is hazardous. This finding is encouraging, and it is similar to what Oyegbami et al. [3] found in their study on the cassava processors' awareness of occupational and environmental hazards associated with cassava processing in south-western Nigeria [4]. This high level of awareness of occupational hazards may not be unconnected with the relatively high level of education among them, with more than half of them having at least secondary school education. This was corroborated with the fact that educational level was found to be significantly associated with awareness of hazards during bivariate analysis, which has been similarly reported by previous authors [5,11]. Other factors that were significantly associated with awareness of hazards were age and gender.

It was however still surprising to find that a third of the Gari processors were not aware of hazards in Gari processing which has been said to be associated with a lot of environmental as well as occupational hazards to the environment, the processors, and even the consumers [4,5]. It was even more surprising that more than three-

fifths of the respondents were not aware of protective measures against the hazards associated with Gari Processing. There is therefore still a need for health education of this group of workers on the hazards associated with their work.

For their use of personal protective equipments, more than two-thirds of the respondents had never used hand gloves, sun hats, overalls, facemasks or helmets. This poor usage of personal protective equipments (PPEs) is shocking, but seems to be the general pattern seen in work places in Nigeria [12]. It may therefore not be surprising that many of the respondents reported different injuries they sustained at work. More than four-fifths of the respondents had had cuts before, while nearly three-quarters had had puncture wounds before. The other common health problems reported by these workers were tinnitus and skin changes. In a similar study carried out by Koledoye et al. [5] in Edo State, Nigeria it was similarly found that skin irritation and cuts were the most common self-reported health problem among Gari processors.

Of those who do not like something about gari processing, over forty-four percent do not like frying/roasting aspect of the work probably as a result of the constant exposure to smoke and fumes from the frying process. The lung functions of the processors were also assessed using the peak expiratory flow (PEF) meter, and a mean value of 304.4 ± 72.5 L/min was obtained. This value is lower than the lower limit of normal (350–500 L/min) [13] and this may be a pointer to the fact that the ventilation function is being gradually compromised, possibly due to the effect of Gari dust and the fumes from the frying process. Reduction in pulmonary function has been found in exposed workers in both soap and non-soapy detergent workers among other [13,14]. On bivariate analysis, the PEFR was not associated with the age, sex or the duration of their involvement in Gari processing.

Conclusion and Recommendation

The level of awareness about occupational hazards was high among the respondents, but their knowledge and occupational safety practices were poor. Consequently, there was a high prevalence of injuries among the respondents and their mean Peak Expiratory Flow rate fell short of the normal, implying a possible compromise in the respiratory function of the respondents. There is need for further health education of this group of workers about hazards and occupational safety practices. It is also important for periodic medical examination to be done on this group of workers so as to detect any deviation from normal early, and hence prevent occupational diseases that may set in later in the life of these local gari processors.

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