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Research

Hazards associated with small scale *gari* processing in Ibadan metropolis, Nigeria

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Abstract

Cassava constitutes an important staple food and source of carbohydrate in the tropical region of the world. There are various hazards associated with gari processing due to the rigorous methods involved. There is need to examine the various hazardous conditions faced by those processing gari with specific emphasis on their working conditions. The study assessed the hazards associated with gari processing. The major processing centres in Ibadan Metropolis were purposively selected. Questionnaire was administered to the total population of the workers involved in gari processing in both centres to investigate physical, ergonomic and biological hazards. All those involved in gari processing were female, most of who had primary school education and mean age of 43 ± 13.8 years. Majority of the people processing gari were exposed to various hazards, which include knife cuts, heat stress, smoke inhalation, eye irritation and insect bites. Musculoskeletal disorders were the most recurring health issues experienced by the gari processing workers. These hazards are however, associated with various levels of health complaints by the gari processing workers. Therefore, there is the need to adequately educate those processing gari on strategies to reduce the risks of exposure to the associated hazards.

KEY WORDS: Gari processing, hazards exposure, health complaints, cassava product

Introduction

Cassava is grown throughout the tropics and could be regarded as the most important energy-giving food in the tropics. It is also an important root crop, in terms of area cultivated and total production. *Gari* is the most popular form in which cassava is consumed in West Africa. It is the most important root crop in Nigeria in terms of food security, employment creation and income generation for crop producing households. Efforts should be intensified by research institutes to develop more cassava varieties that are low in hydrogen cyanide (Akinpelu *et al.*, 2011).

Gari is a free flowing particulate product consisting of cassava granules which has been gelatinized and dried. *Gari* is probably the most important single traditional food in Nigeria (Oluwole *et al.*, 2004) and development of real significance in cassava processing has been concentrated on its production (Njoku and Banigo, 2006). The wide consumption of *gari* has been attributed to its relatively long shelf life compared to other food products from cassava as well as its ease of preparation for eating.

Traditional technologies are limited because they rely on manual operations. However, full scale mechanization, even when technically feasible, is not always economically justifiable as experiences with large, fully mechanized cassava processing plants in Nigeria have shown (Akinrele *et al.*, 1971). There is a wide ranging technology-mix suitable for different scales of processing operations especially the two extremes, traditional and full scale mechanization (Egounley *et al.*, 2002). Cassava processing using traditional method is very tasking, not cost-effective considering the man-hour labour invested when compared to large scale processing. Manual production involves tedious grating of the starchy roots to form the cassava dough and long hours of sitting by smoky wood-fire to fry the semi-dried cassava granules (Stephen and Eric, 2009). *Gari* frying process (*garification*) is a tedious process. The process is preceded by five major processing steps which include: peeling, grating, fermentation, pressing and sieving. Each step in the traditional process consists of complex procedures which depend for its success, almost entirely, on the skill of the operator. Toasting can also be done mechanically using an automated *gari* fryer or other improved *gari* fryer made of stainless steel material and firewood or charcoal as the heat source (Oti *et al.*, 2010). The *gari* processing operator has to sit for long hours and this causes a great deal of discomfort to the operator and particularly from exposure to heat and smoke from the fire and steam.

Gari is a partially gelatinized by greaseless frying, free-flowing granular flour with a slightly fermented flavor and sour taste. In West Africa, it is the most consumed and traded of all food products made from cassava roots. It is consumed either soaked in cold water or stirred in boiling water to make a stiff paste and consumed with choice soup. *Gari* can be yellow (if fortified with red palm oil) or white, although *gari* from bio-fortified cassava is gaining popularity now. Seventy percent (70%) of cassava processed as human food is *gari* (Oduro *et al.*, 2000).

Peeling the cassava tubers is most often done manually through the use of clean and sharp knives to remove the first layer of covering to reveal the tuber. Women and children are dominant at the cassava peeling stage. Cassava peeling takes place in an open space and the majority of the workers are always at the mercy of the weather (Adenugba and John, 2014). *Gari* frying is a task that can lead to musculoskeletal disorders which is painful and often disabling injuries which affect mainly the wrists, back, legs, shoulders, neck, muscles and joints due to prolonged sitting and improper sitting posture. Injuries and illnesses related to poor ergonomic conditions can be prevented by making the workplace and the work organization fit the physical and mental ability of each individual worker.

Humans are exposed to biological hazards in the work environment in a variety of ways. People who work in small scale cassava processing plants, often close to surface water sources and green vegetation, are at risk of exposure to animal diseases and infections, such as malaria, Trypanosomiasis, and many other parasitic infections or cause serious allergy.

Hazards associated with cassava processing in Nigeria are not well documented in literature. Many people are discouraged in engaging in the processing of *gari* because of the perceived hazards associated with the occupation. This study therefore, seeks to identify the various hazards associated with *gari* processing with a view to making recommendations about the management of these hazards.

Materials and Methods

Two predominant *gari* processing facilities in Ibadan Metropolis, located in two Local Government areas were purposively selected for this study. The two Local Government Areas selected were Akinyele and Ibadan North West Local Government Areas. This study was carried out using participant observation, on-spot assessment and interview based questionnaire. Questionnaires were administered to all the *gari* fryers in the processing centres, and the *gari* processors involved in all stages of the *gari* processing (peeling to frying stage) included the study population.

Result and Discussion

The mean age of the respondents in both *gari* processing centres was 43.0 ± 13.8 . Majority of the workers were within the age range of 31 – 50. This indicates that majority of the people processing cassava in the study area are in their productive age, which simply implies that they still have strength and vigour to contribute immensely to the economy of

their community. As shown in Table 1, all the respondents are female, majority of which are married (69.1%) and 70.9% of the respondents are Christians. The respondents are from different ethnic backgrounds. The mean household size of the respondents was 6.2 ± 2.5 . Majority (81.8%) of the respondents spend 8 hours and above at work on a daily basis. Some of the respondents have other sources of income, of which farming is the most common (52.7%).

Table 1 Socio-economic characteristics of the *gari* processors

	Frequency	Percentage	Mean
Location of respondents			
Ojoo	40	72.7	
Eleyele	15	27.3	
Age of respondents			43.4
<30 years	12	22.2	$\delta = 13.8$
31-50	26	48.1	
>50	16	29.6	
Sex of respondents			
Female	55	100	
Marital status			
Single	7	12.7	
Married	38	69.1	
Widow/widower	10	18.2	
Religion			
Islam	16	29.1	
Christianity	39	70.9	
Educational level of respondents			
No formal education	20	37.0	
Primary education	22	40.7	
Secondary education	9	16.7	
Tertiary education	3	5.6	

Manual method using knives of various sizes for peeling is the most common method used for initial cassava processing. As shown in Table 2, 69.1% of the respondents had accidental cuts while peeling

cassava. There was complaint of frequent eye irritation due to visible dust and smoke fumes in the work environment and this can be attributed to the fact that firewood is the only source of energy used as fuel for

gari frying process. Majority (89.1%) of the respondents claim to feel fatigue at work due to their exposure to heat while 98.2% complained of aches and pain due to the stress involved in *gari* processing. A spot observation made revealed that all the workers were not fully clothed, with majority wearing only underwear and wrapper. This could be attributed to the fact that they are constantly exposed to intense heat leading to profuse sweating. This finding is in

consistent with the result of a study conducted by Samual and Adetifa, 2012. Long and constant exposure to this heat condition could further lead to acute dehydration and poor health conditions. Since *gari* processing is the major occupation of these workers, there is need for an improvement in the method used for *gari* frying process to avoid their exposure to intense heat.

Table 2: Exposure of respondents to physical hazards during gari processing

	YES		NO	
	Frequency	%	Frequency	%
Accidental cuts	38	69	17	31
Visible dust and smoke	55	100	0	0
Itching of the body	5	9.1	50	90.9
Skin irritation	11	20	44	80
Eye irritation	55	100	0	0

Musculoskeletal disorders such as pain and stiffness in hands, fingers and wrists (87.3%); pain in legs and feet (90.7%); numbness in legs and feet (81.8%); cramped

waist (90.9%); knee pain (58.2%); back and neck pain (85.5%) were the most recurring health issues experienced by the workers as shown in Figure 1.

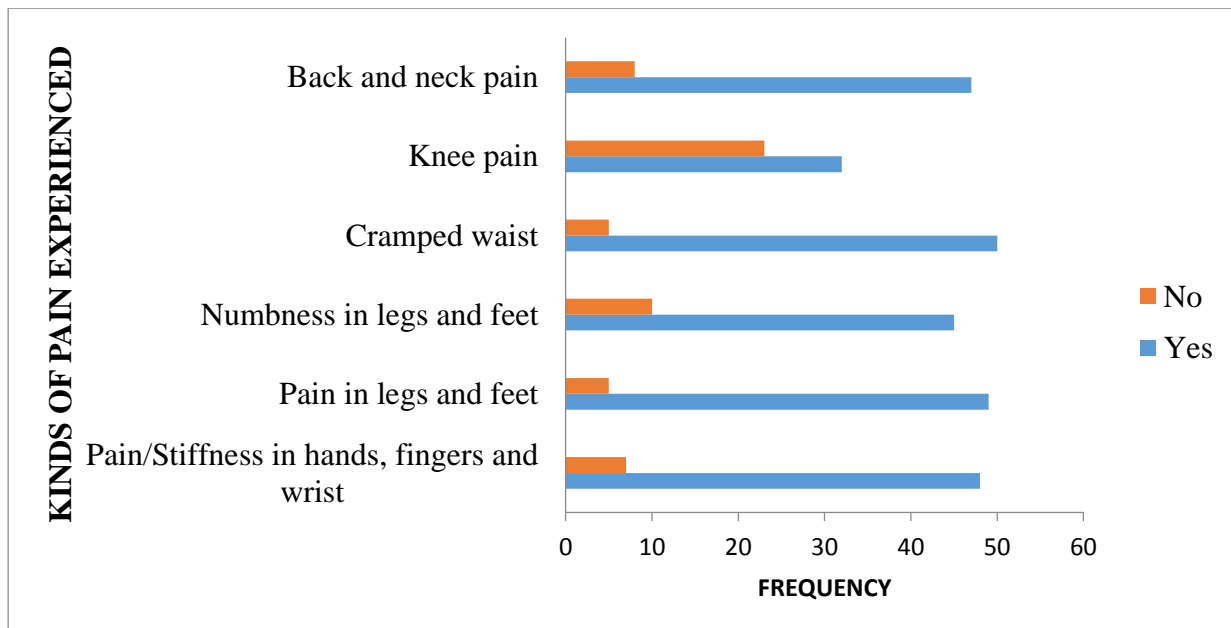


Figure 1: Distribution of the frequency of health complaints experienced by those involved in *gari* processing

Table 3 shows that 98.2% of the respondents encounter biohazards in form of insect infestation in

the processing centres while 89.1% of them agreed to experience insect bites/stings. They however, claimed

that these insects also bite during other steps in *gari* processing, most especially during the process of peeling which is the first step in *gari* processing and usually done in an open space in the morning. Table 4

indicates that mosquito and biting midges infestation are common and this could pose health risks such as malaria and rashes on the skin as a result of the bite from biting midges.

Table 3: Biohazards exposure by the respondent

		YES		NO	
		Frequency	%	Frequency	%
Insect Infestation	54	98.2	1	1.8	
Insect bites/stings	49	89.1	6	10.9	
Skin rashes caused by Insect bites	37	63.3	18	32.7	
Snake infestation	35	63.6	20	36.4	
Scorpions	8	14.6	47	85.4	
Ants bites	37	63.3	18	32.7	
Spider bites	5	9.1	50	91.9	

Table 4: Frequency of insect infestation in the processing centres

	RARELY		SOMETIMES		ALWAYS	
	Frequency	%	Frequency	%	Frequency	%
Mosquito	1	1.8	8	14.5	46	83.6
Biting midges	0	0	10	18.2	45	81.8
Housefly	0	0	23	42.6	31	57.4
Soldier Ants	21	87.5	3	12.5	0	0
Cockroach	3	75	1	25	0	0

Venomous and non-venomous snakes, spiders and scorpions were also identified as biohazards in the *gari* processing areas. They are very dangerous to workers who have existing allergies to the antigens from certain animals. Anaphylactic shock is the body's severe allergic reaction to a bite or sting and requires immediate emergency care. Although, no record of death among *gari* processing workers from severe allergic reactions, it is important these people take adequate precautions from exposing themselves to these biohazards. Stinging insects include bees, wasps, hornets and fire ants while venomous spiders include black widows and brown recluse spiders.

Gari processing activities such as dewatering of the grated *gari* paand storing of the effluents can cause

vector-borne infections, some of which may transformed from zoophyllic (having an attraction to animals) to anthropophilic (human seeking /preferring). Puddles of water at *gari* processing sites could be prime breeding grounds for various types of dangerous insects and some of them act as vectors of disease. Certain simple environmental upkeep measures are to ensure such things as, cans, pottery containers, etc. are kept free of water or turned upside down so that puddle water is removed and vector breeding reduced to some extent. Currently, climate change is enhancing the movement of these vectors to other areas hitherto unaffected.

Conclusion

The study found out that females are dominant in this occupation and the work environment is not conducive. Majority of the workers had primary school education and therefore not quite aware of the health hazards they are exposed to. The ones that had the awareness of the health hazards associated with gari processing claimed that do not have option but to make do with what is available. The fact that the workers sit on stools with no back or arm rest for a prolonged period of time predisposes them to musculoskeletal pains in various parts of their bodies. Majority of the workers complained of numbness in legs and feet, cramped waist, knee, back and neck pain. These conditions make majority of the workers use self-administered drugs every other day to relieve themselves of the pains felt. Therefore, the physical, biological and ergonomic hazards associated with gari processing could be traced to the low interest of people in engaging in this occupation, despite the high demand for gari in Nigeria.

Recommendations

Nigeria is rated as the world's largest cassava producer yet there is inadequate processing machinery and equipment, unconducive environment and lack of credit facilities for small scale processors, which are some of the constraints that must be overcome. The following recommendations are however made;

1. Use of appropriate technology to design good machinery, equipment and comfortable chair to reduce the ergonomic hazards exposure of the gari fryers should be adopted.
2. There should be regular training of workers on strategies to reduce hazard exposure and improve their quality of life.
3. A possible intervention by the government and non-governmental organizations to ensure an improved work environment for the wellbeing of the gari processing workers should be considered
4. Good house-keeping in the gari processing sites is highly advocated.

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