

Assessing Ethnophysiological Use of Spices and Condiments in Bahir Dar City Market, Bahir Dar, Ethiopia: Ethnophysiological Qualitative Study

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To cite this article:

Dessalegn Demeke, Biruk Getahun, Destaw Mulualem Atinafu. Assessing Ethnophysiological Use of Spices and Condiments in Bahir Dar City Market, Bahir Dar, Ethiopia: Ethnophysiological Qualitative Study. *Biomedical Sciences*. Vol. 6, No. 2, 2020, pp. 25-30.

doi: 10.11648/j.bs.20200602.12

Received: January 28, 2020; **Accepted:** February 25, 2020; **Published:** June 15, 2020

Abstract: Spices and condiments are substances added to foods to enhance aroma and taste. The aim of this study addresses the traditional preparation of spice and condiments and give value for indigenous knowledge in the local society. A community survey was conducted. One hundred sixty-nine informants were selected by using a random sampling technique. Semi-structured interviews, observation, in-depth interview and prepared questionnaires were employed to collect pertinent data on the local use of spice and condiments. The data obtained were analyzed by using analytical tools commonly ordered in ethnobiological studies like preference ranking, direct matrix ranking, and pairwise comparison. Twenty four species of spice were found in the market. Eight condiments were identified in routinely prepared dishes. From the result of the Paired comparison, *Allium sativum* scores the highest use-value in the preparation of spice and condiments. The preference ranking result also indicated that Red pepper is the most preferred condiment by the inhabitant of the local community. This study also indicated that the indigenous knowledge in the preparation of spice varies with age groups with the elder more knowledgeable than youngsters. The indigenous knowledge also under threat as the young are not interested in domestic activities. There is knowledge limitation (deterioration) in the younger generation. The younger generation strongly recommends to keep, learn, preserve and maintain their ancestral wisdom for the indigenous use of spice and condiments in the resident.

Keywords: Spice, Indigenous Knowledge, Condiment, Ranking, Ethnophysiology

1. Background

Spices and food condiments are linked historically, chemically and their physiological effects on human bodies [1-2]. A spice is a dried seed, fruit, root, rhizome, bark or vegetable substance that is characterized as “strongly flavored for the aromatic substance of vegetable origin. Those spices are either used for the preparation of condiments or directly add into foods as a flavoring agent to increase its taste [1-3] and identify the nature of the chemical released as sensory transduction through the nasal cavity or taste buds [3-4]. Spice also functional for those physiological points as an analgesic, anti-inflammatory, anti-malarial,

hepatoprotective, antioxidant, antitumor, hypolipidemic and antihelminthic activities of phytochemicals which regulate different body systems [6]. Spices are important for both domestic consumption and export [5].

Condiments are prepared from compounds containing one or more spice [7] extracts to enhance the flavor of the food. Condiments can be both simple (celery salt, garlic salt, onion salt) and compound chili, mitmita, meat sauce, a mint sauce prepared mustard and siljo. Traditionally prepared condiments to give ethnobiological values by using indigenous knowledge [5, 7-8].

Indigenous Knowledge has many applications in law, governance, social work, health and medicine, philosophy,

education, and the environment. This traditional knowledge emerges from the relationship between human beings and their surroundings and is manifested in acts and practices. This knowledge guides actions, which provide feedback regarding local knowledge in the community, which evolves that the information is transmitted from our ancestral social group to the next generation through the interaction between individuals [9-12].

This study document data related to the ethnophysiological and skill of traditional use of spice and condiments in routinely prepared dish in the study area. The study is the way through which people share their indigenous knowledge as one part of the community to promote the establishment of local and cultural knowledge to create awareness for the younger generation concerning the indigenous use of spice and condiments.

This study also used as a source of information, encouraging, and documenting indigenous knowledge by conducting how the people use spices and condiments traditionally and give more focus on indigenous knowledge to society.

2. Methods

2.1. Study Designs and Data Collection Instruments

Ethnophysiological community survey design was conducted to assess the use of spices and condiment preparation related to indigenous knowledge in the Bahir Dar city market. The study was conducted in three markets (kebele sixteen, Kebele eleven and kebele four) of the seventeen kebeles market from January 2019 to February 2019. Based on the data of Bahir Dar city administration office Bahir Dar encompasses seventeen kebeles during a time of data collection. Data on indigenous knowledge use for spices and condiments preparation were collected by employing structurally prepared questionnaires, in-depth interviews semistructured interviews and observation. The local preference value of spice and condiments was determined. The local preference value was indicated by the community as the most preferred and the least preferred value of spice and condiments by ranking the spice and condiments commonly used for the preparation of condiments.

2.2. Study Population

The source populations were all population in Bahir Dar city. The study population was 169 in the three markets corresponding to the three kebeles (kebele sixteen, Kebele eleven and kebele four) in the age range of 18-60 years. From each market, equal proportion respondents were selected by lottery methods until the respondent number reaches 169 with equal to the number of sample sizes.

2.3. Sampling Size and Technique

Bahir Dar city markets (kebele sixteen, Kebele eleven and kebele four) of the seventeen kebeles were selected for the study purposively because the market is available in this

selected kebeles. All the respondents are females and males with an age range of 18-60 years. Population sizes in Bahir Dar city market which use a commercial exchange of spice are approximately 300, considering a confidence interval of 5%, sample size becomes one hundred sixty-nine [22, 24]. Each respondent' was informed about the objective of the study and the benefit associated with indigenous knowledge commonly used in the community. The informants get informed consent and were interviewed by using a random sampling technique until the sample size was saturated.

Through in-depth interviews with the respondents at different levels age range information was obtained concerning spice and condiment preparation in the local community. The trained interviewer also gathers the relevant information related to the condiment preparation context by using a structurally prepared questionnaire to identify the type of spice and condiment prepared and consumed in the local community. A structured questionnaire was prepared in English and translated into Amharic language and was re-translated back to English by linguistic to ensure accuracy and consistency. The entire interview would be held in the Amharic language.

2.4. Data Analysis

Data were edited, coded, entered and analyzed by SPSS version 20. Descriptive statistical methods were used to analyze and summarize the inhabitants' sociodemographic characters. Preference ranking, pairwise comparison and direct matrix ranking commonly employed in ethnophysiological research were used to analyze data of spices and condiments preparation associated with indigenous knowledge.

3. Results

3.1. Socio-demographic Information

Socio-demographic characteristics include, age, sex, educational status were formed based on socio-demographic variables. The contributions devoted to socio-demographic characteristics provide an overview of the available survey (Table 1).

Table 1. Socio-demographic characteristics among inhabitants give responses related to ethnophysiological study in Bahir dar city market, Northwest Ethiopia, 2018. (n=169).

Variable	Frequency	Percentage (%)
Age in years		
18-30	53	31.36
31-45	61	36.09
46-60	55	32.55
Sex		
Male	74	43.78
Female	95	56.22
Educational status		
Illiterate	24	14.20
Read & write	41	24.26
Primary education (1-8)	31	18.34
Secondary education (9-12)	45	26.64
Above 12th grade	28	16.56

3.2. Ethnobiological Use on the Preparation of Spice and Condiments

The ingredient added to each spice and condiments. In this study, eight condiments were assessed in the local

community concerning what kind of spice is added to prepared condiments. Most respondents gave response cross ponding to the condiment with the most important spice added to the prepared condiment (table 2).

Table 2. Indigenous knowledge information base held by the key informants for routinely prepared condiments added to the main dishes.

No.	Condiments	Spice as Ingredients add to condiment preparation
1	Mekalesha	Cinnamon, clove, ginger, cardamom, fennel and black pepper
2	Shiro	Fever tea, thyme, rosemary, cardamom, caraway, and fennel.
3	Red pepper	Red pepper, garlic, ginger, cardamom, Basil, fennel, rosemary, thyme
4	Datta	Green chili pepper
5	Mitmita	Garlic, coriander, rosemary, Basil, fennel
6	Bekolt	Bean, garlic, coriander, chilli, onion, garlic
7	Siljo	Black mustard, safflowers, bean flour, salt, fennel, garlic.
8	Nitirkibie	Fever tea, Basil, cardamom, cinnamon, clove, fennel, long pepper, cumin, ginger, garlic, turmeric, fenugreek, thyme, caraway, rosemary.

3.3. Comparison of Indigenous Knowledge Vs. Age in Spices and Condiments Preparation

The use of spice and condiment were indicated (table 3) that it is directly proportional to age increment and indigenous knowledge practice on the local community. In which elders at a higher age and middle age range reflect more spice and condiments use than youngsters. All informants were found in the second and third age groups.

This could have contributed to the identification and association of spices and condiments use knowledge by both second and third age groups as they are more knowledgeable than the people in the first age groups. Furthermore, data collection from the study area by observation and interviews revealed that informants in the first age groups were not conversant enough in providing some ethnobiological information clearly on the used methods of spice and condiments preparation.

Table 3. Spices and condiments use compared by age groups with KAP (Knowledge, Attitude, and Practice).

Age range	KAP of informants
1 st Age range	Less KAP
2 nd Age range	Excellent KAP
3 rd Age range	Excellent KAP

* KAP=knowledge, Attitude, and Practice.

3.4. Ranking of Spices and Condiments Based on the Perceived Importance

3.4.1. Preference Ranking

As shown in table 4 below Red peppers, stood first among the sex condiments in the preference ranking methods to know ranks of condiments used in the society. This indicates that the indigenous people through life experience have

identified that the best condiments from any other spices that can be used in the same action. The score in the table indicates ranks given to condiments based on this personal preference. The highest number (6) indicates the most preferred and the lowest number (1) the least preferred condiments used in society (Table 4).

Table 4. Preference rankings of condiments used in society.

Condiments	Personal preference values of the respondents						Mean	Ranking
	1	2	3	4	5	6		
Mekelesha	25	17	25	30	35	15	86.50	5 th
Silijo	25	17	8	40	23	14	74.67	3 rd
Red pepper	12	13	10	40	30	40	103.67	1 st
Mitimita	5	27	11	16	25	16	62.83	6 th
Datta	3	35	19	26	36	25	94	4 th
Bekolt	6	12	23	41	25	30	94.67	2 nd

3.4.2. Pairedwise Comparison

For spices that were identified by the informants to be used at their proportions for all values paired comparison was made among the informants to know their ranks. Accordingly,

Allium sativum stood 1st followed by *Trigonella foenum graecum*. This result indicates that *Allium sativum* is much favored over other plant spices in the study area (Table 5).

Table 5. Paired comparison of spices in their proportional use (1=least, 2=good, 3=very good, 4=excellent).

Spices	Proportional use value				Mean	Ranking
	1	2	3	4		
<i>Thymus vulgaris</i>	24	30	40	35	86	4 th
<i>Curcuma domestica</i>	14	39	27	41	81.75	5 th
<i>Allium sativum</i>	10	41	41	42	95.75	1 st
<i>Trigonella foenum graecum</i>	13	35	38	41	90.25	2 nd
<i>Capsicum frutescens</i>	19	22	36	36	78.75	6 th
<i>Carum carvi</i>	21	29	35	33	79	7 th
<i>Ocimum bacilicum</i>	12	35	39	39	88.75	3 rd
<i>Sinops alba</i>	20	30	25	21	59.5	9 th
<i>Syzygium aromaticum</i>	25	27	20	19	53.75	10 th
<i>Zingiber officinale</i>	15	33	22	41	77.75	8 th

3.4.3. Direct Matrix Ranking

Direct matrix ranking draws explicitly upon multiple dimensions of people perceive after various observations. The result of numerous individuals' responses can be added together to create a matrix that is representative of the

community. Alternatively, direct matrix ranking can be done as a group of exercises in which participants reach consensus on the ranking of each item or vote according to their assessments. *Ocimum bacilicum* is the most important spice in society (Table 6).

Table 6. Different values of spices used in society as 0=no use, 1=least, 2=fair, 3=good, 4=very good, 5=excellent.

Use	<i>Curcuma domestica</i>	<i>Allium sativum</i>	<i>Ocimum bacilicum</i>	<i>Thymus vulgaris</i>	<i>Trigonella foenum graecum</i>
Color	5	0	0	0	1
Use in meat	1	4	5	1	0
Herbal medicine	2	4	3	4	4
Remembrance	0	3	3	5	4
Ritual	5	1	3	0	1
Smell	4	3	5	0	2
Total	17	15	19	10	12
Ranking	2 nd	3 rd	1 st	5 th	4 th

3.5. Spice Found in the Study Area

As shown in table 7, the following list of spice was found in the study area available for the preparation of condiments by local inhabitants. (table 7)

Table 7. List of spices used for prepared dishes in the study area.

Scientific name	Local name	Common name
<i>Aframomum corrorima</i>	Korerima	Cardamom
<i>Carthamus tinctorius</i>	Suff	Safflower
<i>Allium cepa</i>	Key shinkurt	Onion
<i>Allium sativum</i>	Nech shinkurt	Garlic
<i>Amomum subulatum</i>	Tikur korerima	Black cardamom
<i>Brassica nigra</i>	Senafich	Black mustard
<i>Bunium persicum</i>	Kemun	Black cumin
<i>Capsicum frutescens</i>	Karia	Chili
<i>Cinnamomum zeylanicum</i>	Quarafa	Cinnamon
<i>Coriandrum sativum</i>	Dimbilal	Coriander
<i>Carum carvi</i>	Nech azmud	Caraway
<i>Cuminum cyminum</i>	Kemun	Cumin
<i>Curcuma domestica</i>	Irid	Turmeric
<i>Foeniculum vulgare</i>	Qundoberbere	Fennel
<i>Lippia javanica</i>	Koseret	Fever tea
<i>Ocimum bacilicum</i>	Besobila	Basil
<i>Piper longum</i>	Timiz	Long pepper
<i>Pipiper nigrum</i>	Tibskitel	Black pepper
<i>Rosmarinus officinalis</i>	Tibskitel	Rosemary
<i>Sinapis alba</i>	Senafich	Mustard
<i>Syzygium aromaticum</i>	Quarafud	Clove
<i>Thymus vulgaris</i>	Tosign	Thyme
<i>Trigonella foenum graecum</i>	Abish	Fenugreek
<i>Zingiber officinale</i>	Jinjibil	Ginger

4. Discussion

Spice and condiments are unique biologically and culturally. As culturally the indigenous knowledge is an outcome of model-making about the functioning of the natural world that is way all societies, pre-scientific and scientific of knowledge and beliefs handed down through generations by cultural transmission to apply (including humans) with one another and with their environment [8-10]. This study revealed that the indigenous people have also developed different methods for cultural transmission about the relationship of living beings, strive to make sense of how the natural world behaves and by collecting, processing, using and conserving these valuable plants and/or their products. Spices are important for both consumptions with food and commercial value [2]. To obtain optimal health benefits from vegetables and spices, it is suggested that humans should consume a balanced diet with a wide variety of phytochemical sources [3]. The present study revealed one study was done in Nigeria's use of spice and condiments [4-6].

Modification of culture and increased business work in the area might be playing a major role in changing the attitudes of the younger generation to ignore the use of indigenous knowledge. Linear thinking is important to this concept as easily described as elders pass on, we are losing much indigenous knowledge. It is not that we disagree or we grieve in our own life the passing of our grandparents and great-grandparents increase the loss of the indigenous knowledge [11-12]. So we strongly keep indigenous knowledge because it improves law, health, agriculture and the natural environment. Cross ponding to this study indigenous knowledge practices is important to control climate change in Ethiopia [16, 25]. One study in Ethiopia also supports spices are important additives to Ethiopian dishes [13]. Ethiopians, in their long history, discovered the medicinal properties of many plants with their provinces had the advantage of recording the information for future generations [14-15, 17]. Other research was also initiated to document indigenous knowledge associated with traditional medicinal plants; specifically to identify the plant parts used for medicinal purposes. Indigenous knowledge also improves Soil and water management [18-20]. After allspice increases food preservation and safety. For example, clove [23] is one of the most valuable spices that has been used for centuries as a food preservative and also black pepper contains antimicrobial compounds that help keep food fresh [21, 23]. Generally, spices are used for flavor, color, aroma, and preservation of food or beverages [7-8].

5. Conclusion

There is knowledge limitation (deterioration) in the younger generation due to the existence of diverse cultural, traditional and belief systems. It is strongly recommended that the younger generation keeps to learn, preserve and

maintain their ancestral wisdom for the indigenous use of spice and condiments in the resident.

Availability of Data and Materials

The data used to support the findings of this study are available from the corresponding author upon request

Authors Contributions

Authors contributed to the concept of the study, the first draft of the paper, the fieldwork, data analysis, and manuscript preparation. The authors also read and approved the final manuscript.

Ethics Approval and Consent Form to Study Participants

The methods of obtaining ethnobiological data followed guidelines set by the International Society of Ethnobiology Code of Ethics to this research. Prior to this oral and written informed consent was obtained from all study participants [26]. No ethical committee permits were required.

Competing Interests

The authors declare no conflict of interest.

Funding

No funding sources.

Acknowledgements

My special gratitude goes to all the study participants who wanted to share their indigenous knowledge.

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