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Benefits of homemade chocolate consumption on human health

Córdova-Avalos, V.¹; Mena-De los Santos, G.³; Cruz- Palacios, V.²; Pérez-Flores, Julián^{1*}; Chávez-García, E.¹; Córdova-Avalos A.³; Córdova-Aquino, J.³; Izquierdo-Reyes, F.¹

¹ Colegio de Postgraduados-Campus Tabasco, Postgrado en Producción Agroalimentaria en el Trópico, C.P. 86500, H. Cárdenas, Tabasco.

² Colegio de Postgraduados-Campus Veracruz, Postgrado en Agroecosistemas Tropicales, C.P. 91690, Tepetates, Veracruz.

³ Universidad Popular de La Chontalpa, Desarrollo Sustentable, Ingeniería y Medio Ambiente, C.P. 86,500, H. Cárdenas, Tabasco.

* Correspondence: julianflores@colpos.mx

ABSTRACT

Objective: To describe the benefits of homemade chocolate consumption on human health in La Chontalpa, Tabasco, Mexico.

Design/Methodology/Approach: We interviewed 49 persons in La Chontalpa, along with 30 contacts from social networks; additionally, a participatory workshop was held with 15 persons trained in making homemade chocolate. A traditional specialist doctor who uses cacao as a medicinal base was interviewed and we were observers during cacao ceremonies. The information was analyzed using opinion analysis and the Chi-square test.

Results: Ninety-seven-point nine percent of the interviewees agreed that consuming homemade chocolate is beneficial for health, while 89.8% mentioned that consuming chocolate makes them feel good. Fifty-five percent of the consumers consider that chocolate provides them energy; 51.1% say that it helps them to control hunger and thirst; and 36.7% feel that consuming it takes away sadness and laziness. The benefits of chocolate consumption reported in the ceremonies, workshops, and interviews were that it controls depression, promotes concentration, and causes joy; it also cures diarrhea, anemia, headaches, and stomach ache.

Study Limitations/Implications: The sanitary restrictions derived from the COVID-19 pandemic limited face-to-face interviews in 2021, which were instead carried out using social networks. It is forbidden to record and take photos and videos of cacao ceremonies; therefore, we were unable to document them.

Findings/Conclusions: In La Chontalpa, Tabasco, the population consumes homemade chocolate because they believe that chocolate provides mental and physical health benefits.

Keywords: cacao, ritual, homemade chocolate, benefits, and self-consumption.

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INTRODUCTION

During the great hierophanies of the Mayan and Mexica peoples, the sacred cacao (*Theobroma cacao* L.) was consumed in medicinal, ceremonial, spiritual, and nutritional drinks, which were prepared with roasted or ground cacao, whisked with water, or sometimes mixed with achiote (*Bixa orellana* L.) and vanilla (*Vanilla planifolia* Jacks. Ex Andrews) and served in *tecomates* (a type of gourd bowl) and clay pots (Uriarte, 2019). Its

nutritional, medicinal, spiritual, and industrial value has given cacao an important role in the history of both Mexico and the Americas. The Spanish marveled at the use that the inhabitants of pre-Hispanic Mexico gave to cacao and took it to Spain, where it was widely accepted for human consumption (Delgado de Cantú, 2015).

The consumption of cacao provided health benefits to the population of Mesoamerica: it took away laziness and cured anemia, diarrhea, sadness, headaches, and stomach aches (Coe and Coe, 2018). It also provided the Mexica warriors with energy, since a cacao drink, served in clay containers or *jícaras* (another type of gourd bowl), would allow them to resist a whole day of battle (Hernández, 2021; Camacho *et al.*, 2017).

The energetic, protein, and medicinal richness of cacao lies in the nutritional composition of its varieties: Trinitario, Forastero, Criollo, and improved Criollo Var. Carmelo (Motamayor *et al.*, 2008). Another species of the genus *Thebroma*, *pataste* (*T. bicolor* L.), also known as Jaguar Tree, is likewise used to make cacao beverages for human consumption, due to its richness in fat, protein, minerals, and amino acids (Tinajero-Carrizales *et al.*, 2021).

The traditions of cacao consumption and cultivation are an Olmec heritage (Uriarte, 2019) that remains in the collective memory of the Mexican people. The native varieties of cacao have been preserved from generation to generation by uses and customs (Camacho, 2018). The use of pre-Hispanic instruments and materials—such as firewood, *chiquihuites* (a small woven basket), *yahuales* (a padded ring used to carry things on the head), *tollas* (fermentation boxes made from regional wood), and *cacaxtles* (a wood backpack)—in the production of homemade chocolate constitutes the cultural essence of the cacaoteros (cacao producers) of La Chontalpa, Tabasco (Pérez-Flores *et al.*, 2021; Camacho 2018).

The use of cacao fruits and beans for disease control is not disseminated in the mass media. The scarce or lack of interest of the state in the promotion of both food policies and the benefits of craft chocolate means that the production of cacao and homemade chocolate cannot supply the demand of the domestic market (Tinajero-Carrizales *et al.*, 2021). Therefore, the objective of this research was to describe the benefits of chocolate consumption on the health of the population of La Chontalpa region in Tabasco.

MATERIALS AND METHODS

Study area

In Mexico, the main cacao-producing states are Tabasco, Chiapas, and Oaxaca. Most of the cacao sold in Mexico is produced in La Chontalpa, which is the region of Tabasco with the largest cultivation area (Gobierno de Tabasco, 2021). The study was carried out in four of the five municipalities that comprise this region: Comalcalco, Cárdenas, Cunduacán, Huimanguillo, and Centro. Villahermosa, the main city and capital of the state, is located in Centro. The other municipalities hold, in the abovementioned order, the first four places in cacao (SIAP, 2020) and chocolate production. The latter is produced by 30 microenterprises and three companies (Sol *et al.*, 2016; Córdova *et al.*, 2018).

Research Methods

The study was carried out from April to November 2021. From April to May, five face-to-face and participatory workshops were held at the Campus Tabasco of the Colegio de Postgraduados with 15 participants trained in chocolate making. The following teamwork dynamic was employed: each workshop had three participants, who provided information about the benefits of homemade chocolate consumption. In May, an electronic interview form was sent to 30 contacts registered in Huimanguillo's Instagram and WhatsApp groups. The information from the forms was transcribed for analysis.

In June, a traditional Mayan ancestral medicine doctor from Miahuatlán, Cunduacán, who uses cacao as a sacred base to heal people, was interviewed in depth. In the church of the Ranchería Plátano y Cacao of Centro, we participated as observers in a ceremony aimed at thanking cacao for the benefits of the traditional medicine project and to spread the cultural and pre-Hispanic richness of cacao.

From July to September, an opinion survey was randomly applied to find out what people think about the benefits of chocolate consumption. These interviews were conducted in homes in Ranchería Azucena 2da. Section (13) and the Ejido José María Morelos y Pavón (27) in Cárdenas and in the downtown neighborhoods of both Cunduacán (6) and Comalcalco (3).

In November, a cacao ritual was attended during the week-long "Fiesta del Cacao" in the Ranchería Miahuatlán. The event was coordinated and directed by a Mayan priest. The event had thirty participants, both Mexicans (from Mexico City, Tabasco, Guerrero, Oaxaca, and Chiapas) and foreign guests (from Cuba, the United States, France, and Guatemala).

The interviews and the observations of the rituals were transcribed to describe the benefits of cacao and chocolate consumption on human health. The responses to the questionnaires were analyzed using frequency tables and the Chi-square test, using the SPSS v.26 software (IBM).

RESULTS AND DISCUSSION

Based on the opinion survey, the 40-60 age range accounted for 42.64% of the sampled population. The average age was 40.7 years. The youngest consumer was 18 years old and the oldest 84 years old. Seventy-one-point-four percent were women and the rest were men. All participants (100%) consume homemade chocolate.

Ninety-seven-point-nine percent of the participants have a positive opinion about the benefits of consuming homemade chocolate. Eighty-one-point-seven percent of the interviewees think that the consumption of chocolate does not harm them and 89.8% mentioned that they feel good in terms of health. In contrast, most people responded that the consumption of industrial chocolate—which has less than 30% cacao beans, high sugar content, and other added components—is harmful for their health (Table 1). Sixty-seven-point-two percent reported acne or obesity as a result of the consumption of industrial chocolate; other damages include cavities, headaches, and diarrhea.

Table 1. Perception of benefits of the consumption of homemade chocolate (n=49).

Variable and measure scale (%)	Frecuency	Measure (%)	Chi-square (value and probability)
I eat homemade chocolate (yes/no).	49	100 yes	-
I buy homemade chocolate (yes/no).	38	77.5 yes	-
Homemade chocolate benefits me (yes/no).	48	97.9 yes	45.082 p=0.0001
Eating homemade chocolate hurts me (yes/no).	40	81.6 no	19.612 p=0.0001
Eating commercial chocolate causes me harm (yes/no)	40	81.6 yes	19.612 p=0.0001
Eating homemade chocolate I feel: good/ Illness	44	89.8 good	31.041 p=0.0001

Jaramillo *et al.* (2018) mention that the consumption of homemade chocolate in Cárdenas, Tabasco is related to the age, gender, and monetary income of the consumer. Consumers over the age of 60 prefer craft chocolate and those between the ages of 20 and 50 prefer to buy commercial sweet chocolate. In the study municipalities, all the interviewees stated that they consumed homemade chocolate. Seventy-nine-point-five percent consume it from 2 to 7 times a week and 20.5% only on festivities. Regarding the way in which it is consumed, 48.9% of the interviewees drink it, 4.1% use it to prepare meals, and 46.9% use it for both purposes. These results match the findings of Córdova-Ávalos *et al.* (2020) and Hernández (2021) who reported that homemade chocolate (with 80% cacao paste) is best for beverages and that these provide physical and mental benefits to human health.

Homemade chocolate drinks are mostly consumed from September to February (Norte wind season). Chocolate is one of the sources of food for the rural and urban population of La Chontalpa (Camacho, 2018; Córdova *et al.*, 2018; Jaramillo *et al.*, 2018). A 39-year-old woman told us that: *I feel happy, energized, and satisfied when I consume cacao, in drinks, food, powder, chocolate, desserts, or as an ingredient in cakes and meals.* Fifty-five percent of the interviewees pointed out that cacao consumption provides energy, 51.1% said that it controls hunger and thirst, and 36.7% mentioned that it takes away sadness and laziness (Table 2).

Table 2. Perceived health benefits from the consumption of homemade chocolate.

Expressed benefits	Frequency	%
Energy at work	27	55
Control hunger	22	44.8
Eliminate laziness	13	26.5
Quenches thirst	8	16.3
Eliminate sadness	5	10.2
Another	1	2.0

A 49-year-old woman informed us that: *chocolate stops depression, helps blood circulation, gives concentration, eating or drinking it makes you happy; its consumption interferes with the production of neurotransmitters, it increases sexual stamina*. This makes sense because the nutrients, minerals, and proteins of cacao contribute to the stability of human health (Pérez-Flores *et al.*, 2021).

Chocolate is rich in B vitamins and minerals such as Mg, Mn, K, P, Cu, and Zn, and it provides tryptophan. This amino acid is a precursor of serotonin, a hormone related to happiness. It also improves mood and fights depression (González-López, 2018).

A 38-year-old woman said that: *Consuming chocolate is good for the heart, cacao improves blood circulation, contains antioxidants that fight free radicals and prevents the premature aging of cells*.

Chocolate contains antioxidants, polyphenols, and flavonoids in higher concentration than red wine, green tea, or some fruits (*e.g.*, apple). Diets rich in flavonoids are inversely correlated with cardiovascular risk. Therefore, cacao has anti-inflammatory effects which help to prevent this type of disease (Gómez-Juaristi *et al.*, 2011).

The flavonoids found in chocolate have antioxidant activity. They can protect tissues from oxidative stress, one of the metabolic alterations described in arterial hypertension (González-López, 2018). For example, 6 g of cacao at night reduced mean systolic blood pressure by 2.9 ± 1.6 mm Hg and diastolic blood pressure by 1.9 ± 1.0 mm Hg without changes in body weight, plasma lipid levels, glucose, and 8-isoprostane (Corti *et al.*, 2009).

Physicochemical analyses report that cacao contains: fat (50%), water (30%), total nitrogen (2.28%), protein nitrogen (1.50%), theobromine (1.71%), caffeine (0.085%), glucose (0.30%), sucrose (1.58%), polyphenols (7.54%), and other elements (Tinajero-Carrizales *et al.*, 2021). The nutritional composition of chocolate depends on the cacao's solids content: the higher the concentration of cacao, the more energetic the chocolate is. One-hundred grams have more than 500 kcal, which is equivalent to 25% of the required daily energy of each person. In addition, a higher cacao concentration implies a decrease in sugar, an increase in mineral content, and consequently a healthier chocolate (Moreno, 2012).

For the Mexica, cacao beans were as valuable as gold and silver and were used as currency, food, and medicine (Coe and Coe, 2018). A key informant, a traditional doctor from Miahuatlán, Cunduacán, who uses cacao as a base for healing, said: *sacred cacao is a food that provides for our families, for our community, for our town, and from there, the cacaotal [cacao plantation] as an agroecosystem will find an interaction between different plants and animals that also serve to cure and heal. Our ancestors taught us, told us, that the Ajaw (God), when he made us, he took the spirit that we carry from the sacred cacao. For this reason, cacao gives us the strength of life, the strength of joy, the strength of hope that we have, so there is an intimate relationship between us and cacao, because it is part of us*.

The bitter-tasting cacao drinks were served and used for spiritual and healing rituals and food; in some cases, they were sweetened with honey from hoverflies, seasoned, colored, and flavored with flowers, fruits, and seeds, and served cool or hot (Coe and Coe, 2018). This tradition is still maintained in southeastern Mexico. In this region, there are plants that give notes of flavors, aromas, and that benefit human health. The leaves, flowers,

fruits, dry seeds, tree barks, roots, and tubers are used for several purposes. The plants most used to prepare food and drinks with cacao include: vanilla, (*V. planifolia*); rosita de cacao (*Quararibea funebris* (La Llave) Vischer), pataste (*T. bicolor*), anise (*Pimpinella anisum* L.), mint (*Mentha piperita* L.), cinnamon (*Cinnamomum verum* J. Prels), allspice (*Pimenta dioica* L. Merril), ginger (*Zingiber officinale* Rosc.), coyoli palm (*Acrocomia aculeata* (Jacq.) Lodd. Ex Mart.), coconut (*Cocos nucifera* L.), achiote (*B. orellana*), and amashito or bird pepper (*Capsicum annum* L. var. *glabriusculum*). In this way, the consumption of cacao contributes to the permanence of natural resources and uses and customs.

The farmers of Tabasco usually consume *pozol*, a sour cacao drink accompanied by *amashito* roasted on a griddle, seasoned with lemon and salt. The consumption of *pozol* has health benefits, because it prevents the dehydration caused by the heat of the humid tropical climate. The drink quenches thirst and hunger and gives energy to resist working days of 8 to 10 hours in the field (Córdova *et al.*, 2018).

The dried, roasted, and ground seeds of the mamey sapote or *pixtle* (*Pouteria sapota* H.E. Moore and Steam) —called *tzapotl* in Nahuatl— are used to make the homemade chocolate drinks known as *pozol* and *tejate*. *Pixtle* is added to the mixture of corn (*Zea mays* L.) dough with cacao to make *pozol*. The fruits of the mamey sapote are obtained from the trees that coexist in the cacao plantations. The *pozol* with *pixtle* is prepared for self-consumption, which increases during the patron saint festivities, the chocolate fairs, and the Day of the Dead, generating joy and happiness in the ceremonial gatherings of La Chontalpa, Tabasco.

At the opening of the Cacao Festival, a cacao ritual during which drinks made with cacao, *pataste*, and corn were offered up took place. One portion of each drink, along with cacao beans, *pataste*, corn, beans, rice, and raw, whole, and plucked sacrificed pullets were deposited in the hollow of a *madre de cacao* tree. An altar was set up near the hollow. Cacao drinks were handed out during the ritual, while pre-Hispanic music was played on native instruments: drums, conch shell trumpets, flutes, and *jícaras*. These rituals are similar to those carried out in the ranches, orchards, and plots of Chiapas and in the Yucatán peninsula (Córdova-Ávalos *et al.*, 2020).

In the face-to-face interview, the 55-years old traditional doctor described the benefits of cacao for human health as follows: *as you can see, cacao helps us to heal, to cure, to harmonize, and to maintain the balance of the four bodies, the four bodies into which ancestral Mayan medicine divides the body: the spiritual body, the physical body, the emotional body, and the rational body. These four bodies take us to the ethereal body that we call the dimension or what we also call... the transcendence in the universe, when we achieve that harmony and balance in the four bodies, we transcend and the sacred cacao helps us, it helps us to heal emotions, it helps us heal negative thoughts. So that's where we start to heal. For example, if you want to heal emotions from traumas and everything you have, we do what we call a trecena de cacao (thirteen dry cacao beans). We make a ceremony for cacao, with respect and everything. That the workers are not exploited, that those who work do it with joy, with love, and with affection.*

In pre-Hispanic times, cacao transcended for the uses and health benefits it provided to the Mayan people. As a sacred, medicinal, spiritual, and nutritional tree and fruit, it was used in agricultural rituals by the people of Mesoamerica (Hernández, 2021; Córdova-

Ávalos *et al.*, 2020). The cacao rituals, celebrated in La Chontalpa, Tabasco, generate positive effects on the participants, on spiritual, ritual, and harmonious terms.

CONCLUSIONS

Cacao and chocolate form a binomial of cultural sacredness of ancient traditions of consumption of beverages and foods made from cacao. The consumption of cacao in homemade chocolate drinks does not harm human health and products with more cacao have a greater impact on physical and mental health. Homemade craft chocolates are preferred by the elderly, while the younger population prefers industrial chocolate. Considering the traceability of the authentic homemade chocolate from La Chontalpa will provide the consumers with greater security, based on the knowledge about its handling, origin, and manufacture.

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