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RESEARCH ARTICLE

Consumption of traditional alcoholic beverages in children from a rural village in Northern Peru, 2017 [version 1; peer review: 2 approved with reservations]

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Abstract

Introduction: Alcoholic beverages have a proven impact on neuronal development and other areas of the body, primarily the heart, kidneys and liver, which is why their consumption in children is prohibited. However, there are traditional drinks that may have alcohol content. The aim of this study was to characterize the consumption of traditional alcoholic beverages in children of a rural village in Northern Peru. **Methods:** This study was an analytical cross-sectional study. Mothers were recruited by census sampling and reported the consumption by their children of two traditional drinks with alcoholic content: Chicha de Jora (Ch) and Clarito (Cl), which are derived from the fermentation of maize. The frequency of consumption, accessibility and perception of consumption risk were described.

Results: Data were collected about 300 children, 61% (183) of whom consumed Ch. and 31% (92) of whom consumed Ch and Cl. Regarding drink accessibility, the majority of mothers said that these drinks were cheap (Ch: 69.0% and Cl: 60.7%). Additionally, the vast majority of families sometimes consumed or always consumed such beverages (Ch: 81.3% and Cl: 65.7%). One in three mothers perceived Ch and Cl as being nutritious and helping their children grow. 25% of mothers perceived that there was no risk to their children from the consumption of the beverages, whereas >60% said that there could be a risk due to the beverages' alcohol content. **Conclusions:** Our study found that traditional beverages containing alcohol are consumed frequently by children in a village in Northern Peru. Mothers provide accessibility to the beverages and perceive the risk the drinks have, yet they continue to provide such drinks to their children putting their health in great danger. We advise that future studies concerning the intervention of these attitudes are performed, for a better future and development of children.

Results: Data were collected about 300 children, 61% (183) of whom consumed Ch. and 31% (92) of whom consumed Ch and Cl. Regarding drink accessibility, the majority of mothers said that these drinks were cheap (Ch: 69.0% and Cl: 60.7%). Additionally, the vast majority of families sometimes consumed or always consumed such beverages (Ch: 81.3% and Cl: 65.7%). One in three mothers perceived Ch and Cl as being nutritious and helping their children grow. 25% of mothers perceived that there was no risk to their children from the consumption of the beverages, whereas >60% said that there could be a risk due to the beverages' alcohol content. **Conclusions:** Our study found that traditional beverages containing alcohol are consumed frequently by children in a village in Northern Peru. Mothers provide accessibility to the beverages and perceive the risk the drinks have, yet they continue to provide such drinks to their children putting their health in great danger. We advise that future studies concerning the intervention of these attitudes are performed, for a better future and development of children.

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Approval Status

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version 2 (revision) 21 Mar 2018	view		view

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1. **Dirk W. Lachenmeier** , Chemisches und Veterinäruntersuchungsamt (CVUA) Karlsruhe, Karlsruhe, Germany
2. **Paul Anthony Camacho López**, Fundación Oftalmológica de Santander FOSCAL, Bucaramanga, Colombia
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Any reports and responses or comments on the article can be found at the end of the article.

Keywords

Alcohol, Children, Health Problems, Peru

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Competing interests: No competing interests were disclosed.

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Introduction

Alcoholic beverages, which are traditionally derived from the fermentation of sugars and yeast¹, currently have a large socio-economic impact. The World Health Organization states that 3.3 million deaths are caused every year worldwide by the harmful use of alcohol². It is well known that these types of drinks cause a series of physiological problems (renal, digestive, hepatic, etc.)^{3,4}, as well as behavioral problems, which include maladaptation to the family and social environment, and, in extreme situations, could lead to suicide⁵.

According to worldwide data, alcohol use has 5.1% comorbidity (high blood pressure, cirrhosis, renal disease, etc.) in the age group between 20–39 years⁶. However, some countries, such as Colombia and Argentina, have reported onset at an earlier age⁷. In Peru, there is almost no information on this subject (information that is provided is mostly provided by local institutions); however reports show that the median age when alcohol consumption begins is 13 years, while in locations where children have greater access to alcoholic beverages, consumption starts at 10 years⁸.

Chicha de Jora (Ch) and Clarito (Cl) are drinks derived from the fermentation of maize that have been consumed since Pre-Hispanic times⁹ throughout the northern coast of Peru. Consumption is high due to their low production cost, ease of access, and tradition¹⁰. These factors can create a problem if such drinks are consumed by children and teenagers. The objective of this study was to characterize the consumption of these traditional alcoholic beverages in children of a rural village in Northern Peru.

Methods

Design and study population

A cross-analytical cross-sectional study was carried out between February and May 2017, in which the mothers and/or guardians of the Northern Peruvian settlement of “La Piedra”, where 308 children under the age of 15 reside, were surveyed. Household visits were completed for the purposes of the study. Thanks to the information provided by the governor, the surveys were carried out in each of the homes of the mothers and/or guardians using census sampling. A sample size was calculated for a descriptive study, for the local population of children, with a statistical power of 99%, a 95% confidence level and a maximum prevalence of 50%. A minimum sample of 300 children was obtained; this was captured non-randomly.

All mothers residing in the populated center (small town) during the interview were included. Mothers who did not wish to participate in the study, as well as those mothers who responded inadequately to our survey were excluded. After reading through the informed consent and agreeing to participate the mothers were enrolled in the study. Those who did not respond adequately to the survey (unanswered questions and/or incomplete answers) were excluded. Rate of rejection = 2.5%, thus achieving a total of 300 surveys applied, obtained from the interview of 103 mothers or guardians (in some cases the mothers or guardians had more than one child).

Survey design

For the present study, a survey was carried out, which was previously validated by a pilot study in a sample of 50 individuals, where a Cronbach’s alpha of 0.781 was obtained. The previous pilot study was not published, the results were only for the evaluation of the survey. The survey had minor modifications after the pilot study. These were used to specify the details of consumption, access and even the consequences of the consumption of alcoholic beverages. The final survey had two main sections ([Supplementary File 1](#)):

Socio-demographic data: Basic data was provided, such as the child’s age, weight, height and school grade, and in addition the number of household members and household income.

Characteristics of drinking habits in liquids/beverages: These characteristics were evaluated through closed questions, in which inquiries were made about the daily consumption of different drinks, primarily the consumption of beverages containing alcohol (Ch and Cl). The following information was obtained: The frequency of consumption, the accessibility of the drinks, whether or not they were consumed by the person responding to the survey and by the whole family, and if consumption of the drinks was perceived to be harmful or nutritional for the child’s health. Finally, other exploratory variables were captured, such as the consumption of other types of beverages (gas, pure water, milk, lemonade, Chicha Morada, etc), and a section where the child’s socio-academic problems were assessed was included. These exploratory variables are not discussed in the present study.

All surveys were anonymous and were conducted by a researcher belonging to the study. The approximate duration of the survey was 20 minutes. At all times the assigned researcher was properly trained to be able to solve doubts about any of the questions.

Data analysis

For the data analysis, a double digitizing system (data processed by two researchers separately, and then checked for errors manually) was performed, for a better control of the data collected. Surveys were entered in the Microsoft Excel program (version 2015), then proceeded to make a first filter for checking the data. Following this, the data were processed in Stata 11.1 (StataCorp LP, College Station, TX, USA).

For descriptive statistics, we worked with frequencies/percentages for categorical variables, and medians and interquartile ranges for the quantitative variables. The chi-square statistical test was applied for the association of the consumption of the drinks versus the perception that the consumption of the drinks could be bad for children. $P < 0.05$ was considered statistically significant.

Ethical statement

Permission and support was provided by local authorities (governor, health center doctor and school director). Since children were the target of this study, all precautions were taken to ensure anonymity and respect for ethical precepts. The study was approved

by the Ethics Committee of the San Bartolomé National Hospital, endorsed by the National Health Institute (NIH; approved March 5, 2016; Office No. 422). This committee was chosen since there is no committee that monitors the approval of the NIH where the study was conducted. This committee also approved the pilot study. The ethical standards on human experimentation of the Declaration of Helsinki of 1975 were taken into account. The results will be given to the sanitary authorities of the region, so that they can learn about this reality and put forward strategies of help. The study was carried out under the permission of the mothers/guardians, who gave written informed consent.

Results

Data were collected about 300 children, 51.3% (154) were girls, and the median age was 9 years (interquartile range: 5–12 years). 15.8% (41) studied at an initial level, 53.5% (139) studied in a primary school and 30.7% (80) studied in secondary school. 61.0% (183) and 30.7% (92) consumed Ch and Cl, respectively (Table 1).

Table 1. Consumption of traditional alcoholic beverages in children from a rural village in Northern Peru (n=300). Quantitative values are presented in median (interquartile range).

Beverage	Child consumption, n (%)	Consumption frequency, per week	Consumption initiated, years
Chicha de Jora	183 (61.0)	3 (1-7)	3 (2-5)
Clarito	92 (30.7)	3 (1-7)	4 (2-5)

Most of the mothers reported that they consumed Ch (84.7%) and Cl (62.7%) when they were children, and the majority also consume the drinks now (Ch: 74.0% and Cl: 47.7%). Regarding accessibility of the beverages, the majority of mothers said that these drinks were cheap (Ch: 69.0% and Cl: 60.7%), and the vast majority of families sometimes consumed or always consumed such beverages (Ch: 81.3% and Cl: 65.7%) (Table 2).

35% of mothers perceived that Ch is nutritious and helps growth, while 33% and 35% of mothers perceived that Cl is nutritious and helps growth, respectively (Figure 1). 25% of mothers perceived that there was no risk for their child to consume the beverages. However, >60% said that there could be a risk due to the alcohol contained in the drinks (Table 3).

Table 2. Accessibility of traditional alcoholic beverages to children from a rural village in Northern Peru (n=300).

	Chicha de jora, n (%)	Clarito, n (%)
Mother's consumption		
Consumed as child	254 (84.7)	188 (62.7)
Consume currently	222 (74.0)	143 (47.7)
Accessibility		
Thought to be cheap	207 (69.0)	182 (60.7)
Family consumption		
Never	56 (18.7)	103 (34.3)
Sometimes	175 (58.3)	159 (53.0)
Always	69 (23.0)	38 (12.7)

Figure 1. Mothers' perceptions of nutrition and aid for growth provided by traditional alcoholic drinks consumed by children.

Figure 2 shows that although women perceive consumption of beverages as bad for their children, 46% and 34% still gave their children Ch and Cl, respectively.

Dataset 1. Raw data from the responses of mothers/guardians concerning their children's consumption of traditional alcoholic beverages (n=300 children)

<http://dx.doi.org/10.5256/f1000research.12039.d170158>

Table 3. Perception of risk of traditional alcoholic beverages for children of a rural village in Northern Peru (n=300).

	Chicha de jora, n (%)	Clarito, n (%)
Health benefits		
Not dangerous	59 (25.8)	56 (24.8)
Dangerous	0	0
Reasons for danger		
Alcohol content	145 (63.3)	150 (66.4)
Religion forbids it	6 (2.6)	0
Does not help knowledge	3 (1.3)	3 (1.3)
Decreases intelligence	3 (1.3)	3 (1.3)
Other	13 (5.6)	14 (6.1)

Discussion

The consumption of alcohol in children is still a very important problem, as evidenced in this study, where out of 300 children surveyed, 183 and 92 children consumed Chicha de Jora (Ch) and Clarito (Cl), respectively, every week. These results of consumption are greater than in different studies from different countries. For example, in Brazil only 12.8% consumed some type of alcoholic drink before the age of 10¹¹; in the Province of Buenos Aires, 55.4% of teenagers between the ages of 11 and 14 years consumed alcohol¹²; while a study in Colombia, with a mean age of 14.4 years, concluded that the pattern of alcohol abuse measured by the CAGE scale was 14.6%¹³.

The consumption of these traditional beverages also occurred during the mothers' childhood, with a majority stating that they had consumed both drinks. Many of the mothers expressed that they still consume them. A report of a population study in Chile, of 408 alcoholic respondents, reported that 27.2% lived with children in the house and in 46.3% of cases the drinker was either the father or the mother¹⁴. Another report in Angola showed that 56% of mothers of 319 children had regular alcohol habits. Our study showed that this percentage was higher at 84.7% of mothers who consume Ch and 62.7% who consume Cl¹⁵. Also in Brazil, Argentina, Colombia, Chile, and Mexico, it was reported that occasional consumption of alcohol is associated with family context, influence of friends, antisocial behavior, and skills and experiences already acquired in childhood, which could be circumstances that encourage the consumption of alcohol in children^{11-13,16,17}.

Figure 2. Percentage of consumption of alcoholic beverages among mothers who perceived that drinks could be bad for their children.

The consumption of alcohol in younger populations has risen in recent years, which has the potential to cause harm and create addictive behavior¹⁷. In our population, the acquisition of Ch (69.0%) and CI (60.7%) was considered economical because of their low cost of production; therefore making them more accessible and frequently consumed. One in every three mothers perceived that the Ch and CI are nutritious and help the growth of their children, and this is a perception that could lead them to giving these drinks to their children. A study from Spain reported that fathers and mothers do not consider their children's alcohol consumption to be a problem¹⁸, thus increasing their early intake without restriction. Unfortunately, no studies about the consumption of alcohol or drugs by children and adolescents guided by therapeutic or beneficial purposes from parents has been reported until now.

In the present study, most mothers knew about the risk of alcohol consumption by children. However, it was observed that the consumption in most of their children remained high. Studies carried out in Spain and Cuba indicate that the family can be a protection, but also a risk factor. In both cases, the maternal figure tends to have a positive influence on the child, which differs from what was found in the present study^{18,19}. We can infer that this is mainly due to a socio-cultural characteristic where the community (and especially the mothers) view the consumption of these traditional alcoholic beverages as normal.

The study had the limitation of selection bias, since it was completed in a sample that does not represent the total population of

Peru. However, this study used census type sampling in a population that had not been previously reported; therefore, these results can be taken as preliminary. Notably, these findings can be used to alert the responsible authorities, so that screening and support measures can be implemented, so that the families of this village, and other similar locations that present similar conditions of consumption, can receive the necessary support.

Conclusions

According to the present study, it is concluded that children consume a large quantity of traditional alcoholic beverages and their mothers provide accessibility. Even though the mothers perceive the risk that these beverages have, they still provide them to their children.

Data availability

Dataset 1: Raw data from the responses of mothers/guardians concerning their children's consumption of traditional alcoholic beverages (n=300 children). doi, [10.5256/f1000research.12039.d170158](https://doi.org/10.5256/f1000research.12039.d170158)²⁰

Competing interests

No competing interests were disclosed.

Grant information

The author(s) declared that no grants were involved in supporting this work.

Supplementary material

Supplementary File 1: Survey for mothers/guardians relating to the consumption of traditional alcoholic beverages in their children. This survey is provided in Spanish and English.

[Click here to access the data.](#)

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[Data Source](#)

Open Peer Review

Current Peer Review Status: ? ?

Version 1

Reviewer Report 25 August 2017

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Paul Anthony Camacho López

Research department, Fundación Oftalmológica de Santander FOSCAL, Bucaramanga, Colombia

The article is interesting, but the presented analysis only is descriptive, losing the relevance and applicability. I suggest that Authors enlarge the analysis, which should evaluate the potential risk factors. The conclusion is adequate, but only they could describe the consumption of traditional alcoholic beverages.

The introduction is not enough to explain the problem compared to the use of alcoholic beverages. In the methods, authors should clarify the patterns of consumption, the frequencies of consumption per week or monthly. The data analysis only centered in the descriptive the mother's consumption (perceptions), accessibility and perception of risk, but they did not analyze the association or relation with child's age, weight, height and school grade, household income and number members.

Is the work clearly and accurately presented and does it cite the current literature?

Partly

Is the study design appropriate and is the work technically sound?

Partly

Are sufficient details of methods and analysis provided to allow replication by others?

Partly

If applicable, is the statistical analysis and its interpretation appropriate?

Partly

Are all the source data underlying the results available to ensure full reproducibility?

Yes

Are the conclusions drawn adequately supported by the results?

Partly

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Epidemiology

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

Author Response 16 Mar 2018

Martín Vilela, Antenor Orrego Private University, Trujillo, Peru

Dear reviewer, the requested changes have been made in the comments, in the same way, we communicate that this is a preliminary study and we take into account in a future study to consider data in associations, as well as associated factors.
On behalf of the Authors, very grateful

Competing Interests: No competing interests were disclosed.

Reviewer Report 31 July 2017

<https://doi.org/10.5256/f1000research.13025.r24666>

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Dirk W. Lachenmeier

Chemisches und Veterinäruntersuchungsamt (CVUA) Karlsruhe, Karlsruhe, Germany

The authors provide a pilot study into the consumption of traditional alcoholic beverages in rural Peru. The article is interesting and novel as there is clearly a lack of data on unrecorded alcohol from South America. It is also quite disturbing to read that considerable alcohol exposure may occur in children.

The following revisions should be considered:

1. For the international reader the beverages Chicha de Jora and Clarito are almost unknown. Can some information about these beverages be provided as background? For example, are they similar to maize beers? What is the typical alcoholic strength of these beverages? Are they commercially and legally sold by some kind of artisanal small-scale industry, or are they illegally sold? Should they be considered as falling into the WHO category of "unrecorded alcohol" (see Rehm et al.¹ for definition).
2. The conclusion states that the products are providing "great danger" to health. While this may be true, there is not much in the data that would allow for such a conclusion. The study appears to be non-quantitative in nature and the alcoholic strength of the product appears

to be unknown. Hence no calculation of daily alcohol exposure can be made, which would allow for a quantitative risk assessment (such as by using the margin of exposure approach²). With the currently available data I would suggest to conclude that there may be a health hazard, but quantitative intake assessment as well as chemical characterization of the beverages would be necessary for risk assessment.

3. The introduction of the abstract is written in a rather vague fashion. "... traditional drinks that may have alcohol content". Are Ch and CI without alcohol available? This should be clarified.
4. Introduction, last paragraph. The reference 9 mentions "Chicora de Jora". Is this the same as "Chicha de Jora"? Reference 10 mentions "girl from Jora"? Are these translation mistakes? Are there any more reliable peer-reviewed references with background on the beverages than some theses? Can a link to the source of reference 10 be provided?
5. Methods, characteristics of drinking habits in liquids/beverages: what beverage is "gas"? Clarify that Chicha morada is non alcoholic.
6. Table 3: check values for line "dangerous". Is this logical that both are "0"?
7. Discussion, first sentence: Please provide percentages to make the values more easy to compare with the data from Brazil and Colombia.
8. Page 6, first line: please clarify where the consumption has risen (in Peru?)
9. Page 6, 4th line: "low cost of production". Please provide some comparison for the low cost. Are the alcoholic beverages cheaper than non-alcoholic alternatives such as milk or fruit juices?
10. Page 6, 1st paragraph, last line "no studies about consumption of alcohol and drugs by children". I wonder about this request and why this is seen as unfortunate. I would find it highly unethical to study alcohol and drug consumption in children, and I can predict that we will never see such a study. This sentence should be deleted.
11. Discussion, last paragraph: please include the non-quantitative nature as limitation. Considering your comment that "the consumption of these traditional alcoholic beverages" is seen as "normal", is there at least some information how much of the beverages is consumed by the children?
12. Conclusions: "it is concluded that children consume a large quantity of traditional alcoholic beverages". This conclusion appears to be not founded in the data. No quantitative measurements were conducted.

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Is the work clearly and accurately presented and does it cite the current literature?

Yes

Is the study design appropriate and is the work technically sound?

Yes

Are sufficient details of methods and analysis provided to allow replication by others?

Yes

If applicable, is the statistical analysis and its interpretation appropriate?

I cannot comment. A qualified statistician is required.

Are all the source data underlying the results available to ensure full reproducibility?

Yes

Are the conclusions drawn adequately supported by the results?

Partly

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Risk assessment of unrecorded alcohol

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

Author Response 16 Mar 2018

Martín Vilela, Antenor Orrego Private University, Trujillo, Peru

Dear reviewer, the changes requested in the comments have been made.
On behalf of the Authors, very grateful

Competing Interests: No competing interests were disclosed.

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