

Oxidation damage in brick artisans exposed during the production process in the city of Chihuahua, Mexico.

García P. Héctor. I.¹, González G. N.A.¹, Quintanar E. M.A.², Ojeda L. S.L.¹, López T. M. A.¹, Carrera G, M.A.², Intriago O. M.P.²

¹Universidad Autónoma de Chihuahua. Facultad de Enfermería y Nutriología. Programa Maestría Salud en el Trabajo. Escorza No. 900, Col. Centro Chihuahua, Chih., México.

²Universidad Juárez del Estado de Durango. Av. Universidad y Fanny Anitúa S/N C.P. 34000 Zona Centro. Durango, Dgo. México.

¹Contact: noumenon_19@hotmail.com

Introduction: Informal, handmade brick production in Mexico and Latin America provides main raw materials for one of the most important local industries: construction. Such process presents unsafe occupational practices through the baking of the product and subsequent exposition of the artisans to emissions, aggravated by the lack of work hygiene habits and protection measures inherent with the prevalently poor socioeconomic level. This activity lacks proper recognition and remuneration, while maintaining its work process almost untouched since the late XIX century (Figure 1), along with a series of work health risks and demands, such as physical risks from high temperatures, mechanical risks from accidents and falls, biological risks from drinking polluted water and the lack of local drainage, ergonomic concerns from forced postures, and chemical risks from exposure to pollutant emissions. Inefficient practices during the product's baking contribute to this issue. Baking time is long, generating noxious fumes for both workers and nearby communities.

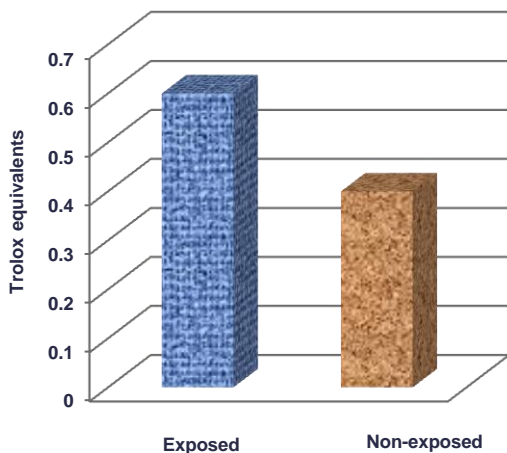
The World Health Organization (WHO) determined exposure to solid-biomass-derived combustion, especially from wood burning, as the second cause of Chronic Obstructive Lung Disease (COLD), especially in developing countries like Mexico (1). Though baking time depends on the oven and arrangement of the bricks load, it can go up to 48 hours of worker vigilance and tending of the baking embers. Crucial component for COLD's pathogeny is oxidative stress, a state of imbalance during the necessary oxidative events in the organism stemming from the increase in the concentration of oxidant molecules, such as oxygen free radicals, in relation to antioxidant molecules, causing metabolic dysfunctions in the organism.

Objective: Establishing the levels of oxidant damage and antioxidant capacity in occupationally exposed handmade brick production workers in a Chihuahua city community.

Methodology: Visits were carried out in order to determine the work process. An instrument was put together expressly for gathering social-demographic and work health info, applied to two groups of male gendered individuals: group I formed by 19 clinically healthy individuals working maintenance in a school, and group II formed by 19 occupationally exposed individuals working the process of handmade brick production, with a working day of at least 8 daily hours for 6 days a week. In situ peripheral blood samples were taken from selected at random healthy individuals for lab analysis. Both groups had their clinical conditions assessed (anthropometric measures, arterial blood pressure, blood chemistry, lipid profile and general urine test); total antioxidant capacity and oxidative damage like lipoperoxidation were assessed as antioxidant system. Samples were segregated based on confounding factors such as alcohol consumption and age.

Blood was fractionated through centrifugation into erythrocytes to check for oxidative damage in lipids through lipoperoxidation measuring, quantified through Trolox Equivalents and given significance by T-test statistical analysis (Graph 1).

Results



Graph 1. Antioxidant capacity levels comparison.

Antioxidant capacity was found diminished in occupationally exposed individuals in comparison to a similar, non-exposed group.



Figure 1. Handmade brick making process.

Conclusions: This group of workers is subject to an increase in oxidative stress from a deficiency in their antioxidant capacity. Latent cellular damage can be assumed, with risk of becoming more evident as the exposure time increases, until manifesting as cellular and systemic damage, such as skin disorders (of which a case of skin cancer had already been spotted by health personnel), situation aggravated by the little supervision product of the informal nature of the work, the low education level and the government mandating their relocation to the outskirts of the city. There exists a social compromise with brick artisans, because of the work risks they expose themselves to, and the need for pursuing and being educated about personal healthy behavior, and the need for more efficient and less pollutant ovens for brick baking.

Bibliography:

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