

Indoor Air Pollution and Pathologies of the Nose and Sinuses

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Abstract— Background: In tropical environments, the multiplicity of sources of indoor air pollution linked in part to the activities of populations have a considerable impact on their state of health, aggravated especially in recent years by the advent of global warming. Many health effects are mentioned, pathologies of the respiratory system (rhinitis, bronchitis, asthma) are those most often reported. Many of these manifestations are allergic in nature. **Objective:** To describe pathologies of the nose and sinuses in patients exposed to indoor air pollution. **Methods:** Cross-sectional study, descriptive from February 1, 2018 to April 30, 2018 involving all patients during the study period. **Inclusion criteria:** All patients consulting for nasal sinus pathologies who have agreed to adhere to the study protocol. **Non-inclusion criteria:** Patients without nasal sinus pathologies and those who did not agree to submit to the survey. **Paraclinical data** focused on standard sinus X-rays and allergy tests. **Results:** Of the 638 patients registered during the study, 208 had pathology of the organs of the nose and sinuses or 32.6%. The 16-25 age group was mainly concerned (60%). The female sex predominated (70%). The main pollutants of indoor air found were: household smoke for 50% and aerosol products for 40%. Rhinosinusitis and nasopharyngitis were the main pathologies with 25 cases (60%) and 10 cases (20%) respectively. **Conclusion:** This study confirms the impact of indoor pollutants especially domestic smoke on the state of the organs of the nose and sinuses, young people are especially concerned hence the place of measures to make living environments healthier by promoting effective public policies on local environmental health.

Keywords— Indoor pollutants - impact on health - nose and sinus - environment.

I. INTRODUCTION

"Poor habitat conditions increase the prevalence of asthma, respiratory and skin allergies, and other lung diseases," the World Health Organization (WHO) said (1, 2).

Thus, according to a Harris Interactive opinion study conducted at the end of 2013, in Europe as in the United States, 9 out of 10 inhabitants consider the air quality in their homes to be good even though they do not know how to evaluate it and that, in general, the quality of indoor air is worse than outside: 2 to 5 times higher according to the US Environmental Protection Agency (EPA) (3, 4, 5, 6).

In tropical environments, the multiplicity of sources of indoor air pollution linked in part to the activities of populations have a considerable impact on their state of health, aggravated especially in recent years by the advent of global warming (1, 2, 7, 8, 9, 10, 11).

Objective

To study diseases of the nose and sinuses in patients exposed to indoor air pollution.

II. METHODS

This is a cross-sectional study, descriptive from February 1, 2018 to April 30, 2018 involving all patients presenting to the ENT department of the District IV Hospital of Bamako during the study period.

Inclusion criteria: All patients consulting for nasal sinus pathologies who have agreed to adhere to the study protocol. **Non-inclusion criteria:** Patients without nasal sinus pathologies and those who did not agree to submit to the survey.

Variables studied

- Socio-demographic situation (age, gender, residence, ethnicity)
- Socio-economic situation (occupation, housing, social charges, monthly income)
- Clinical data (Type of nasal pathology, symptoms, and their duration)
- Paraclinical data: Rx of sinuses (Blondeau), Allergy tests (specific and total IGE, Complete blood count - Eosinophils, mast cells, basophil levels)
- Ethical considerations: Informed patient consent was verbal, clearly explained and always requested.

Data collection technique

The information was gathered through patient interviews and additional examinations. the data was recorded on a survey sheet prepared for this purpose.

Data entry and analysis was done using epi info7 software.

III. RESULTS

We carried out a prospective, descriptive cross-sectional study that took place in the reference health center of Commune IV from 1 February 2018 to 30 April 2018. In total, we registered 638 patients including 208 patients for nasal and sinus pathologies (32.6%).

Indoor pollution was the triggering and/or aggravating factor in 55 patients or 26.4%.

Demographics:

Table I: Age distribution

AGE (years)	0-15	16-25	26-35	36-45	46-55	56-65	66-75	76-85	Total
Number	10	20	5	5	2	7	3	3	55
%	20	50	8	8	2	6	3	3	100

The 16-25 age group accounted for 50% of cases

Table II: Gender distribution

Sex	Male	Female	Total
Number	10	45	55
%	30	70	100

Female accounted for 70% of cases

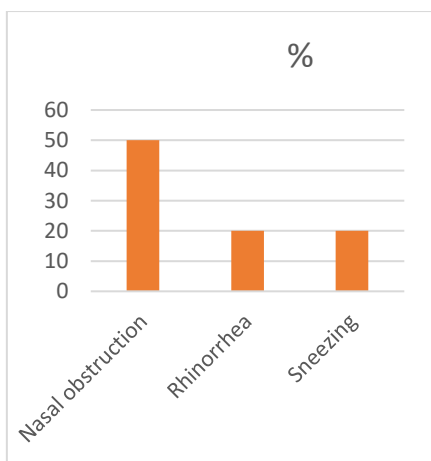


Fig. 1: Distribution by major rhinological symptoms or syndromes

Nasal obstruction, rhinorrhea and sneezing were the major symptoms of nasal pathology with a peak for nasal obstruction at 50%.

Table III: Distribution by determinants of nose and sinus pathology

Determinants (exposure factor)	Dust	Smoke	Cooling	Total
Number	20	25	10	55
%	40	50	10	100

Smoke was the predominant exposure factor, accounting for 50% of the factors.

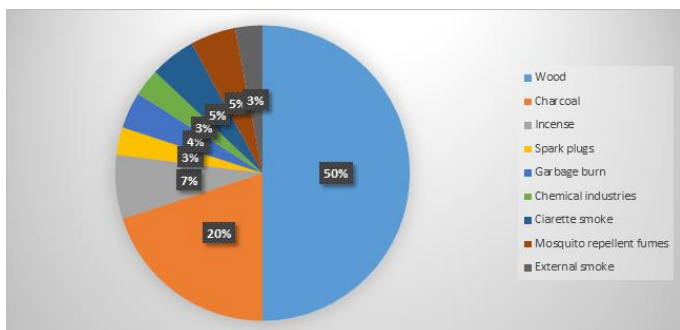


Fig. 2: Determinant Distribution of Carbon Monoxide Factors

Smoked wood accounted for 50% of the determinants of carbon monoxide factors.

Table IV: Distribution by Determinants of Aerosol Products

Aerosol Product Determinants	Product composed of bleach and detergent	Gardening and DIY products	Insecticide spray products	Produces spray air fresheners	Total
Number	20	7	15	13	55
%	60	5	20	15	100

The product based on bleach and detergent 60% was mostly the products irritating the nasal cavity.

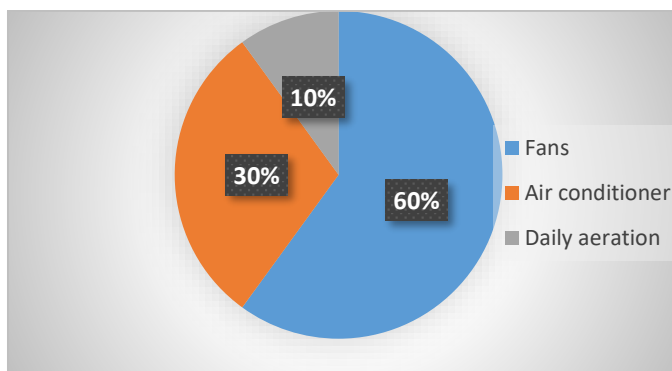


Fig. 3: Others determinants Factors

Fans 60%, air conditioners 30% were essentially factors favoring pathologies of the nose and sinuses.

Table V: Distribution according to duration of symptoms of nasal pathology

Duration of ENT symptoms	0-7 days	7days-1month	1-2months	2-4months	Subacute or chronic > 3 weeks	Total
Number	3	5	7	15	25	55
%	3	7	10	20	60	100

Chronicity was predominant with 60% of cases.

Table VI: Impact of nasal pathologies on lifestyle

Lifestyle	Social life	Professional life	Sleep	Total
Frequency	10	15	30	55
%	15	25	60	100

Nasal pathologies mainly disrupted sleep for 60% compared to other lifestyles

Table VII: Distribution by diagnosis

Select ed diagnosis	Allergic rhinitis	Chronic rhinosinusitis	Acute sinusitis	Rhinopharyngitis	Simple atrophic rhinitis	Complicated atrophic rhinitis	Total
Frequency	7	25	6	10	4	3	55
%	8	60	7	20	3	2	100

Among the diagnoses retained, chronic rhinosinusitis accounted for 60%.

IV. DISCUSSION

Air pollution is contamination of the indoor or outdoor environment by any chemical, physical or biological agent that

modifies the natural characteristics of the atmosphere (WHO)(1, 2).

Our results confirm to some extent the effects on our health of indoor air pollutants, its effects can be immediate or long-term (chronic pathologies or serious diseases) (2, 5, 6, 12, 13, 14, 15). They depend on the nature of the pollutant and the quantities inhaled, the age of the subject, his vulnerability, his habits ... (10, 11, 13, 16).

According to the Indoor Air Quality Observatory, the French lose an average of 9 months of life expectancy because of polluted air in their homes, up to 13 months in the most polluted countries according to the WHO (1).

Many health effects are mentioned (1, 6, 17), pathologies of the respiratory system (rhinitis, bronchitis, asthma) are those most often reported (6, 7, 11, 12, 18). Many of these manifestations are allergic in nature (5, 11, 16, 19).

Our work has made it possible to describe the effects of indoor pollutants on the upper airway, our results are comparable to those of other authors for similar work (5, 7, 8, 12, 15, 19):

1. Frequency:

In total, we registered 638 patients including 208 patients for nasal pathologies (32.6%). Of the 208 cases of nasal pathologies, indoor pollution was the triggering and/or aggravating factor of 55 patients or 26.4%.

El khatanni and A. Aichane in Morocco found out of 336 patients, a prevalence of 37.8% (19).

2. Socio-demographic aspect:

Age:

The age group represented in our study was 16-25 years (60%).

This is explained by the attendance of the center much more by adults than by young people.

This trend is confirmed in other studies in our country (7, 18).

Elsewhere in the Maghreb (North Africa), El ketani and A. Aichane found 45% of the 15 to 49 age group (19).

Sex:

The female sex was found in 70% of cases. This female predominance is explained by a sedentary lifestyle at home (i.e. women are more exposed to indoor pollution). This predominance is confirmed in the thesis of Ragain A by 70.9% of cases (5) and in other studies (20, 21, 22, 23)

3. Determinants or triggers of indoor pollution

Exposure factors:

Smoke exposure factor (50%) was the most important determinant of nasal pathology than other exposure factors. This is due to the wood that women often use to cook but the incense in smoke also to make the smell of the room sweet. Smoked spiral mosquito repellents are often used against mosquitoes with a cheaper price and accessible in all places of commerce.

Carbon monoxide determinants:

Wood represents 50% among the determinants of carbon monoxide factors responsible for pathologies of the nose and sinuses compared to other carbon monoxide factors. This is due to the low monthly income partly for the population and

therefore gas for cooking or charcoal has become inaccessible due to lack of financial means.

Determinants according to aerosol products:

Bleach and detergent products (60%), insecticide spray (20%), body deodorants (15%) are mostly products that irritate the nasal and sinus mucosa.

Other significant determinants: fans, very poorly maintained air conditioners also impact the upper respiratory tract.

4. Impact of nasal and sinus pathologies on lifestyle

Among the lifestyle identified, sleep was the most disturbed in 60% of cases. This explains why nasal pathologies have a negative impact on lifestyle such as leisure, work, sleep, sports activities. A study carried out by the CFOA (French Committee for the Observation of Allergies) looked for these consequences on 1002 students, 22% of whom suffer from allergic rhinitis. Among them, 40% say they are embarrassed in their school work. 57% of these students have sleep disorders, 49% admitted to missing classes because of their allergies. Finally, 26% say they have difficulty concentrating due to headaches, sneezing, difficulty breathing or a desire to sleep (5). This significant frequency is mentioned in others studies (1, 7, 12, 13, 20)

5. Distribution by diagnosis

Among the diagnoses retained, chronic rhinosinusitis accounted for 60%.

Exposure to pollutants from the inside have a considerable impact on the muco-ciliary carpet with a slowdown in its operation, see its total blockage causing the occurrence of chronic pathology in the organs of the nose and sinuses (total blockage of the maxillary ostia), This state of toxic inhibition of mucociliary function by polluting particles is largely confirmed by the authors (5, 8, 11, 12, 16, 24, 25).

V. CONCLUSION

This study confirms the impact of indoor pollutants especially domestic smoke on the state of the organs of the nose and sinuses, young people are especially concerned hence the place of measures to make living environments healthier by promoting effective public policies on local environmental health.

VI. RECOMMENDATIONS

To health authorities:

- Promote promotional policies for behavioral change in the face of indoor pollutants.
- Make drugs accessible and at a lower cost to treat nasal sinus pathologies.
- Train and retrain staff for the management of these pathologies.
- Provide the indicated services with pollutant measurements (sensors) allowing studies with other structures (research units for example and others ...)
- Equip the services concerned with adequate equipment for the diagnosis and care of patients.

To health workers:

- Inform, educate and sensitize patients on the pathologies of the nose and sinuses with the consideration of pollution factors.

- Insist more on the need to honor prescribed medications
- Systematically educate patients about the negative impacts of determinants or triggers of indoor pollution

To patients:

Good tips for healthy housing:

Ventilate the rooms of the habitat daily, between one and two hours.

Prohibit smoking,

Promote the hygiene of the habitat (floors, bedding, washing sheets, avoid the proliferation of mites ...)

Avoid certain pets (cats, dogs, and any furry animal).

Reduce humidity.

Have ventilation and ventilation grilles checked and maintained regularly.

Limit the use of cleaning products.

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