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RESEARCH ARTICLE

Paranasal Sinuses Pathologies and Personal Habits among Patients

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ABSTRACT

Background and Aim: Paranasal sinuses are air-filled hollows within the facial bones around the nasal cavities. Sinuses pathologies ranging from inflammatory diseases to neoplasm. The predisposing factors of paranasal sinuses pathologies include but not limited to; tobacco smoking, exposure to cold and alcohol consumption. This study was designed to evaluate the relationship between these pathological occurrence and personal habits among participants referred for CT in Port-Harcourt, Nigeria. **Materials and methods:** This was a prospective cross-sectional study. Data used for this study were obtained using both capture sheet and questionnaire. Approval for this study was also obtained and patient's consent was properly sought. The examinations were performed on general electric CT machines. The data were analyzed using descriptive and inferential statistics with significance level set at $P < 0.05$. **Results:** Sinusitis 55.95% ($n = 47$) was highest and osteoma 1.19% ($n=1$) was the least. Maxillary sinuses were highly involved 47.72% ($n=42$). Males were 60% ($n=18$) and females 40% ($n=12$). Non-smokers 56.57% ($n = 17$) and smokers 43.33% ($n=13$). Alcohol consumers 66.66% ($n = 20$). There was no statistical relationship between PNS pathologies occurrence and smoking status ($p=0.094$), but there were statistical significant relationships between alcohol, air condition usage and living environmental conditions at $p=(0.007, 0.000$ and $0.000)$ respectively. **Conclusion:** sinusitis was the most prevalent pathology in this study. Male preponderance was noted. There was no statistical significant relationship between smoking histories and occurrence of PNS pathologies, but there were statistical significant relationships between other variables evaluated and PNS pathological occurrence.

Key words: Paranasal sinuses, Pathology, CT, Sinusitis, Habits.

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1. Introduction

Paranasal sinuses are group of air- filled hollows that lie within the facial bones in a multifarious order around the nasal cavities(1-3).These sinuses developed from the invagination of the nasal mucous membrane into the cartilaginous nasal sheath to form four known types of sinuses; frontal, ethmoidal, maxillary and sphenoid sinuses(1, 4-5). Paranasal sinuses help in the humidification and warming of an inspired air, regulation of intranasal pressure, reducing of the skull weight and also in sound production(6-8).Paranasal sinuses diseases ranges from inflammatory to neoplasms (9-10). Previous studies and literature reviews by (11-15), revealedthat individuals are affected by the various PNS pathologies due to various factors such as allergy, infections by pathogens such as virus, bacteria, fungal and some personal habits such as excessive exposure to cold, tobacco smoking, alcohol consumption as well as living in an unhygienic environments. These factors have tremendously contributed to the occurrence of sinus infections in developing countries including Nigeria (13, 15).Although several imaging modalities can be used for the evaluation of PNS pathologies, computed tomography (CT) scan is the gold standard modality with excellent ability to detect the presence of sinusitis, plan for functional endoscopy sinus surgery with clear anatomical definition of structures, nature and the extent of the diseases, be it soft tissue and bony involvement(2,10,16-19). A good knowledge of the paranasal sinuses pathologies occurrence and personal habitual correlations would be useful information to the ear, nose and throat (ENT) Surgeons, and physicians managing these conditions. To the best of the researchers' knowledge, our study is the first to capture data on the paranasal sinuses pathologies and personal habits among patients undergoing CT PNS in Port Harcourt Rivers State, Nigeria. This study was designed to investigate the following specific objectives:

- Spectrum of paranasal sinuses pathologies
- Age and gender distribution of the pathologies.
- The relationship between the paranasal sinuses pathologies occurrence and personal habits of the patients.

2. Materials and Methods

The CT examinations of the PNS were performed using multi-slice helical general electric (GE) CT machines. The procedure was carried out by qualified Radiographers who instructed the patients to remove all denature such as earrings and necklaces around the region of interest to avoid artifacts and also collected a written consent from the patients. A coronal scan was performed with patients placed in a prone position with head first, arms beside the trunk, neck is hyperextended. The section was planned using the

acquired scout image starting from anterior frontal sinus to posterior sphenoid sinus using standard parameters (slice thickness 3mm, slice interval 3mm, field of view, 180mm, matrix 512 X512, mAs 400, Kvp 120, helical scan mode, bone plus and standard reconstruction algorithms). The acquired images were reformatted into the various planes such as coronal and sagittal planes. Iodinated contrast medium was given to some patients based on the referring physicians' request or the finding on the non-contrast enhanced sections. The images were interpreted by qualified and highly experienced consultant radiologists.

A prospective study design was adopted in this study and data such as spectrum of PNS pathologies, age and gender were collected using data capture sheet while information on the personal habits such as smoking status, alcohol consumption, Air conditioner system usage, and the living environmental conditions of patients were collected using simple open and closed – ended questionnaire from December, 2016 to April, 2017. One to one method of administering questionnaire was adopted to administer the questionnaire to the patients prior to the CT investigation proper especially during patient preparation stage. The Radiographers and nurses who were involved in the procedure were informed about the procedure and their supports were properly sought. The ethical approval and permission to collect data for this study was obtained from the study centers Research and Ethics committees. All patients' information obtained were treated with high level of confidentiality and patients' consent was properly sought. Personal habits, demographic data and PNS pathologies diagnosed on CT between December, 2016 and April, 2017 were included in this study. A total of 30 patients' sample size was purposively selected based on the set inclusion criteria for this study.

The obtained data were processed using Excel 2013 version and statistical package for social sciences (SPSS) version 20(IBM corporation, Chicago, IL, USA). These data were also categorized and analyzed using both descriptive and inferential (Chi-square and Spearman's correction coefficient tests) statistics in line with the study specific objectives with statistical significance level set at $p < 0.05$.

3. Results and Discussion

We examined 30 consecutive patients with male to female ratio of 1:1.5, which is 60% (n = 18) males as compared to the females counterpart of 40% (n = 12) with mean age of 32.78 ± 5.8 years (Range 10-76 Years). From table 1 above, majority of the patients were males 60% (n = 18) compared to their female population which is 40% (n = 12). Greater number of the patients were within the age group of 21-

31years old 33.3% (n = 10) and the least were within age group 54 years and above 10% (n=3).

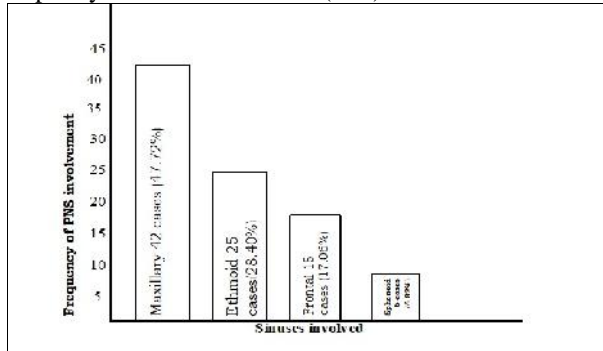


Fig.1: Frequency distributions of paranasal sinuses involvement by PNS pathologies

From fig. 1 above, the most common affected sinus by pathology is the maxillary sinuses 47.72% (n = 42) followed by ethmoid sinuses 28.40% (n = 25) and the least was sphenoid sinuses 6.82% (n = 6).

From table 2 above, out of 30 patients studied, 88 cases of PNS pathologies were identified with sinusitis as the highest 55.95% (n = 47) followed by polyps 19.05% (n = 16) and the least was osteoma 1.20% (n = 1). From table 3 above, out 30 patients evaluated for smoking habit, 43.33% (n = 13) were smokers. 20 (66.67%) out of the sample size studied consumed alcohol while the remaining 33.33% (n = 10) were abstainers. Table 4above showing the relationship between the PNS pathologies occurrence and personal habits, reviewed that, out of 20 alcohol consumers identified in this study, polyps was highest 5.95% (n = 5) followed by both sinusitis and papilloma which is 4.96% (n = 4) respectively and the least was osteoma 1.19% (n = 1). Out of 13 smokers studied, 8.33% (n = 7) had sinusitis and none had papilloma, granulomados disease, Fibrous dysplasia and ostoma. Chi-square (X^2) and Spearman's correction coefficient tests wereused to test for the statistical relationship between paranasal sinuses pathologies occurrence and personal habits and the results shows that there is statistical significant relationship between PNS pathologies occurrence and alcohol consumption, AC usage and living environment conditions, at p values (0.007,0.000,0.000) respectively, but there is no statistical significant relationship between smoking history and PNS pathologies occurrence p value(0.094) (Table4).

Discussion

Various previous studies have reported sinusitis as the most common PNS pathology followed by polyps and Osteoma as the least (10, 20). Our study showed agreement with the findings of the aforementioned studies. The high prevalence of sinusitis in our study could be ascribed to the low socio-economic factors and overcrowding which are prevalent in developing countries like Nigeria(2,20).Maxillary sinuses were the most prevalently involved sinuses followed by ethmoid sinuses and the least was sphenoid sinuses in this study. This is in agreement with previous studies conducted by (2, 10, 20-24). The result in this study and that of previous aforementioned studies in which maxillary sinuses

were highly involved, have been attributed to the anatomical position of the maxillary sinuses which are located inferior to the nasal cavities and their drainage are aided by gravity(2,20).

In this study, young adults within the age range of 10-42 years were prevalently affected by PNS pathologies. This has been ascribed to more exposure to predisposing factors of PNS pathologies in cause of their search for white collar jobs and irregular checkup (2, 20). This finding is consistent with previous studies conducted by (2, 10, 13, 14, 20). In their studies, young adults within 1st and 4th decade ages were reported to be highly affected. Patients between the ages of 0-9 years were not included in this study based on the inclusion criteria. Males were highly affected by PNS pathologies than females in thisstudy. This is in agreement with the findings of similar studies conducted by (10, 13, 22). In Verma et al(10) study, males where highest 51% (n = 51) when compared to females population 49% (n = 49) and in Manijit study(22), males were 67% (n=67) while females 33% (n = 33). Males prevalently been affected by PNS pathologies could be attributed to the fact that males were more exposed to PNS pathologies predisposing factors such as dusty, polluted environments, as well as personal habits such as smoking and alcohol consumption. There is disagreement between our finding and the findings in the study conducted by (20,25). According to Abbas et al (20), females were highly involved 53.75% compared to male population 46.25%. Timmangouda reported females 65.4% against males 34.6%. Abbas et al (20) attributed their finding to the fact that females were more exposed to dust and smoke from home cleaning and cooking than males.

With regard to the frequency and percentage distribution of occurrence of PNS pathologies and the studied personal habits, the result of this study revealed that majority of the patients were non-smokers, alcohol consumers, AC users and those living in both polluted and dusty environment. With respect to smoking status, the finding in this study is in agreement with previous studies conducted by Cooke and Haddley(1991) and Tarp et al (2000) cited by (14)which revealed that smoking habit doesnot have any correlation with abnormal findings in paranasal sinuses. According to Kabeya et al (14) finding, non-smokers were highest 56.6% (n = 764) followed by past smokers 30.9% (n=417) and the least were current smokers 12.5% (n = 169). Non-smokers been prevalent in this study disagreedwith Reh et al (15) which stated that smoking is an established risk factor for paranasalsinuses pathologies.

The discrepancies between our findings could be attributed to geographical variation and the small sample size used in this study. With regard to alcohol consumption, our finding is also in agreement with previous study conducted by Kabeya et al (14) among 1350 patients in Japan using magnetic resonance imaging over a period of five years. Ologe and Adenji (13) reported that dusty and polluted environment is a major predisposing factor to PNS pathologies and this is in agreement with the finding of this

study. The most common PNS pathology identified among the various personal habits was sinusitis followed by polyps and the least was osteoma. Chi-square test and Spearman’s correlation coefficient test were performed to evaluate the statistical significant relationship between the studied personal habits and the occurrence of PNS pathologies. The

test statistics shows that there is no statistical significant relationship between smoking habit and the occurrence of PNS pathologies, but there are statistical significant relationships between alcohol consumption, AC usage and living environmental conditions and the occurrence of PNS pathologies.

Table 1: Age and gender distribution of patients

Age group (Years)	Gender		Row Total
	Male	Female	
10 – 20	5 (16.67%)	3 (10.00%)	8 (26.67%)
21 – 31	8 (26.67%)	2 (6.66%)	10 (33.33%)
32 – 42	1(3.33%)	3 (10.00%)	4 (13.33%)
43 – 53	3(10.00%)	2 (6.66%)	5 (16.66%)
54 and above	1(3.33%)	2 (6.66%)	3 (10.00%)
Total	18 (60%)	12 (40%)	30(100%)

Table 2:Frequency Distribution of Paranasal Sinuses (PNS) Pathologies

PNS pathologies	Frequency and Percentage (N, %)
Sinusitis	47 (55.95%)
Polyps	16 (19.05%)
Carcinoma	6 (7.14%)
Mucocele	3 (3.57%)
Papilloma	5 (5.95%)
Granulomatous Disease	4 (4.76%)
Fibrous Dysplasia	2 (2.38%)
Osteoma	1 (1.20%)
Total	84 (100%)

Table 3: Frequency Distribution of the Studied Personal Habits

S/N	Personal Habits	Frequency and Percentage (n,%)
a)	Smoking Status	
	Non-Smokers	17(56.57%)
	Smokers	13(43.33%)
b)	Alcohol consumption	
	Abstainers	10(33.33%)
	Consumers	20 (66/67%)
c)	Air Conditioner System Usage	
	Non – users	10 (33.33%)
	Users	20(66.67%)
d)	Living environmental Conditions	
	Dusty and Polluted	25 (83.33%)
	Not Sure	5 (16.67%)

Table 4:The relationship between occurrence of PNS pathologies and personal habits studied

Personal Habits	PNS Pathologies, N(%)								R.T	P-Value
	SIN	POLY	PAP	MUC	CA	GD	FD	OS		
Alcohol consumers	4(4.76)	5(5.95)	4(4.76)	1(1.19)	1(1.11)	3(3.57)	1(1.19)	1(1.19)	20	0.007
Smoker	7(8.33)	3(3.37)	0	1(1.19)	2(2.38)	0	0	0	13	0.094
Living environmental conditions	20(23.8)	5(5.95)	1(1.19)	0	3(3.57)	0	1(1.19)	0	30	0.000
Air condition system usage	16(19.5)	3(3.57)	0	1(1.19%)	0	1(1.19)	0	0	21	0.000
Total	47(55.9)	16(19.05)	5(5.95)	3(3.57)	6(7.14)	4(4.76)	2(2.38)	1(1.19)	84	100%

SIN- Sinusitis, POLY-Polyps, PAP-papilloma, MUC-Mucocele, CA- Carcinoma, GD – Granulomatous Disease, FD-Fibrous Dysplasia, OS –Osteoma, RT- Row total.

4. Conclusion

Sinusitis is the most prevalent PNS pathology in this study. Majority of the recruited patients were within age range of 1st to 4th decades. Alcohol consumers and non-smokers were associated with occurrence of PNS pathologies in this study. Inferential statistics shows no statistical significant relationship between smoking history and occurrence of PNS pathologies, but there were statistical significant relationships between other studied personal habits and the occurrence of PNS pathologies.

Conflict of Interest: We declare no conflict of interest.

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