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Original Research Paper

Otorhinolaryngology

OLFACTORY DISFUNCTION IN CHRONIC KIDNEY DISEASE GRADE 5 USING SNIFFIN STICKS TEST

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ABSTRACT

BACKGROUND: Smell perception is one of the most important aspects of life, odor perception leads to introduction of different types of food, detection of possible harmful elements and overall quality of life. In chronic kidney disease (CKD), kidneys are disturbed to filter blood so that the body's remaining metabolic substances such as urea, uric acid and creatinine can not be excreted. Urea retention may result a smell disturbance by uremic binding OBPs and lipocalins mechanism, thereby saturating olfactory signaling pathways

DESIGN: Cross sectional observational study.

METHODS: A total of 45 patients CKD Grade 5 were included in the study. Olfactory function was assessed for odor threshold, discrimination and identification using Sniffin Sticks Test.

RESULT: The mean of TDI is 26.3 (SD = 4.9). Impaired olfactorydetection was found 64.4% of patients with 27 subjects suffering from hyposmia and 2 subjects suffering from anosmia.

KEYWORDS : Olfactory, Sniffin Stick, CKD.

1 INTRODUCTION

The impairment of olfactory function in CKD would contribute the incidence of anoreksia (Raff,2008). Olfactory impairment is oftened occurred in common people unconsciously, and patients did not impair thus (Sobol,2002; Landis,2011). The impairment of olfactory function was undergone by many people, occurred in 19% in ages of over 20 years and as 25 % in the ages of over 53 years. In the study of Murphy et al reported there were 14 million Americans suffered from the impairment of chronic olfactory function (Murphy,2000; Holbrook,2014).

The impairment olfactory function alone can also become the sign of disease. One of the impairment of olfactory causes was CKD. CKD is a clinical condition signed with the decreasing of irreversible renal function and or the damage of renal occurred more than 3 months, such as structional or functional disorder. At present the prevalence of CKD had been increased progressively and become the problem of common people healthy (Sobol,2002; Suwitra,2009).

According The 7th Report Of Indonesian Renal Registry, reported that in Indonesia (2014) there were 13.758 patients were diagnosed CKD. In Sumatera Utara reported that there were 628 new patients were diagnosed CKD. Meanwhile in Haji Adam Malik General Hospital during 2015 there were 363 patients were diagnosed CKD-G5. Up to now there was no report about the impairment olfactory function in CKD in Indonesia mainly in Haji Adam Malik General Hospital. This study aimed to investigate olfactory function in CKD G5 patients.

The Sniffin Sticks test is a test to assess the chemosensory of the smell. This test has been used in more than 100 published studies, also used in many private practice physicians in Europe. Odoran contained in the Sniffin Sticks test is an odoran familiar to the European, but less familiar with other countries. According to Shu, Sniffin Sticks test can be used on the Asian population (Hummel, 2007; Shu, 2007).

METHOD

A total of 45 patients CKD G5 were included in this study, sample was taken before having regular hemodialysis. Patients were recruited from outcome patient hemodialysis unit in Haji Adam Malik General Hospital. Inclusion criterias: Regular Hemodialysis Patients > 3 months, age ≤ 60 years, then did not suffer from upper respiratory diseases, no history of head trauma, Chronic sinonasal diseases. Did not work or live in chronic toxic agent exposure and participate in this study to signature informed consent. The study protocol was approved by the local ethics committee.

2 RESULT

Table 1. Score Threshold, Discrimination, Identification and TDI.

Threshold		Discrimination	Identification	TDI
Mean	6.4	9.4	10.6	26.3
SD	1.2	2.5	1.8	4.9
Minimum	4.1	4.5	5.0	14.3
Maximum	9.1	13.6	14.0	33.9

Table 1 presents the average value of TDI is 26.3 (SD = 4,9) with the smallest TDI value is 14.3 and the largest is 33.9.

Table 2 Cross Tabulation between respondent's TDI and Sex

	TDI			
	>30 (Normosmia)	16-29 (Hyposmia)	<15 (Anosmia)	n
Male	12 (40%)	17 (56,7%)	1 (3,3%)	30 (100%)
Female	4 (26,7%)	10 (66,7%)	1 (6,7%)	15 (100%)
Total	16 (35.6%)	27 (60 %)	2 (4,4)	45 (100%)

Hyposmia also found in both sex (Table 2). In males hyposmia were 56.7% and in females were 66.7%. Meanwhile in the anosmia category in males were 3.3% and in females were 6.7%.

Table 3 Cross Tabulation between respondent's TDI and Level ureum

	TDI			
	>30 (Normosmia)	16-29 (Hyposmia)	<15 (Anosmia)	n
51-100 mg/dl	1 (25.0%)	2 (50.0%)	1 (25.0%)	4 (100%)
101-150 mg/dl	11 (35.5%)	19 (61.3%)	1 (3.2%)	31 (100%)
151-200 mg/dl	4 (50.0%)	4 (50.0%)	0 (0.0%)	8 (100%)
> 200 mg/dl	0 (0.0%)	2 (100%)	0 (0.0%)	2 (100%)
Total	16 (35.6%)	27 (60 %)	2 (4,4)	45 (100%)

Table 3 showed that in ureum level group 51-100 mg/dl had the most TDI that was hyposmia (50%). In ureum level group 101-150 mg/dl had hyposmia (61,3%). In ureum level group 151-200 mg/dl had hyposmia (50%).Meanwhile ureum level group >200 mg/dl had 100% Hyposmia.

Table 4 Cross Tabulation between respondent's TDI and BMI

	TDI			
	>30 (Normosmia)	16-29 (Hyposmia)	<15 (Anosmia)	n
18.5 (Underweight)	0 (0.0%)	5 (100%)	0 (0.0%)	5 (100%)
18.6-24.9 (Normoweight)	13 (48.1%)	14 (51.9%)	0 (0.0%)	27 (100%)
25-29.9 (Overweight)	3 (23.1%)	8 (61.5%)	2 (15.4%)	13 (100%)
Total	16 (35.6%)	27 (60 %)	2 (4.4)	5 (100%)

Table 4 showed that in all underweight group (100%) had hyposmia, in normoweight group there were (51,9%) had hyposmia and in overweight group there were (61,5%) had hyposmia..

3 DISCUSSION

In this study the mean TDI score was obtained 26,3 (Hyposmia). There were 64,4% patients experiencing impaired of olfactory were 27 patients (60%) were hyposmia function and 2 patients (4,4%) were anosmia function.

This was the same with the study done by Frasnelli et al were the lost of olfactory function found in 56% patients were 33 patients with hyposmia and 3 patients with anosmia function (Frasnelli, 2002).

In this study mean ureum level was 139,3 mg/dl. Data was more various in ureum level < 200 mg/dl. Distribution of TDI score based on ureum level group tended below TDI normal.

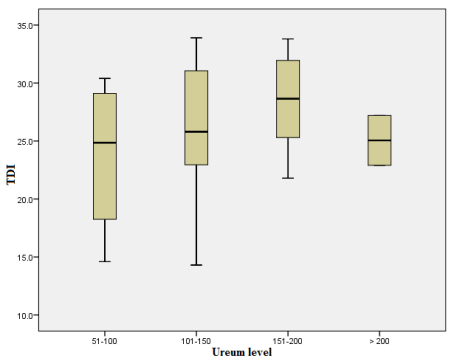

Figure 1 Distribution patern of TDI score based on ureum level

Uremic toxic is defined as small molecule substance that is excessive and remained in patient CKD even after patient undergo Hemodyalisis (Whitson,2014). Urea retention in the blood may result olfactory impairment with mechanism a hydrophobic uremic toxicity that bind to the Odoran Binding Protein (OBPs) and lipocalins, thus saturating the olfactory signaling pathway at this stage and inhibiting the OBPs participating in the odor delivery function to olfactory receptors (Suwitra,2009; Ramirez,2012; Whitson;2014).

Any toxins that slow or stop cell growth can impair the olfactory system. Uremic toxic retention is responsible for olfactory impairment in patients with CKD by damaging the regeneration of olfactory neurons and or disrupting the maintenance of homeostasis that is essential for normal function of epitel olfactory and bulbus olfactory (Bomback,2011).

In this study found distribution of TDI base on BMI that was the lowest TDI score in underweight and overweight group. Meanwhile the highest TDI score in Normoweight BMI group, with mean BMI level was 22,8 (normoweight).

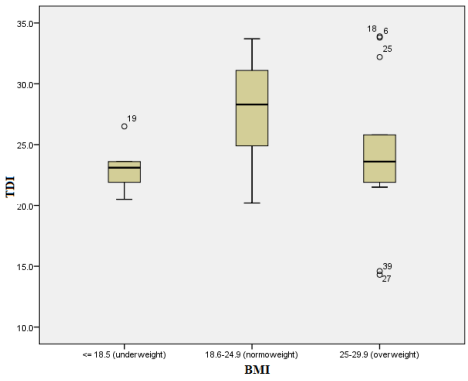

Figure 4 Distributionpatern of TDI score base on BMI

The study of Raff et al study that there were no olfactory function differences between CKD with nutrition status patient compared with healthy control. However, patients with the lowest olfactory score were also significant to have the lowest nutrition status (Raff,2008). Reduced sensitivity of smell function is considered as a supporting factor of malnutrition. Patients CKD have a high prevalence of having a malnutrition condition, Thus diet became a significant part of the therapeutic regimen (Landis,2011; Lalwani,2007).

Besides, maybe there were no direct relations among the decressing of olfactory function and nutrition status. As newest data showed that more patients who suffered the impairment of severe smell was not consistent in the decreasing of body weight, however body weight was remained or increased (Landis,2011).

In this study showed that in patient CKDG5 occurred significant olfactory impairment 64,4%. Patient CKDG5 might be suffer from olfactory function impairment with variative scale.

The study about olfactory impairment in patient CKD which was reported limited. Further study is needed to see the relations CKD to olfactory impairment with bigger sample amount.

4 CONCLUSION

The mean of the TD of the sample is 26.3 (Hyposmia). Olfactory impaiment in the sample was found to be 64.4% where as 27 were hyposmia and 2 with anosmia function.

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