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Research Article

LEAD INTOXICATION AND SCHIZOPHRENIA IN MALAYSIA

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ABSTRACT

Blood lead (Pb) is known as one of the common pollutants in the environment. It was found to be related to certain chronic diseases like hypertension and neurobehavioural problems. This study was conducted to determine the association between blood Pb and schizophrenia in Malaysia. This case-control study involved 50 cases of schizophrenic inpatients and 50 controls from non-psychiatric patients. Their blood was taken for blood lead analysis using atomic absorption spectrophotometer (AAS). The schizophrenic group has a significant higher blood Pb compared to the control group, 4.73±1.67µg/dL and 3.36±1.69 µg/dL respectively with t=2.737 (p=0.007). Serum Pb was recognized to be elevated among the schizophrenia compared to non-schizophrenia subjects in this study. The finding indicated that in spite of regular treatment, the physician needs to monitor patients' blood Pb for a better response and outcome of the antipsychotic drugs.

INTRODUCTION

Schizophrenia is one of common psychiatric condition throughout the world. It was related to positive family history, poor nutritional status (Arinola *et al*., 2010), presence of problems in social adaptation (Gan *et al*., 2014; Gilbert *et al,*. 2013) and recently found due to certain heavy metals like lead (Pb) (Stanley *et al.*, 2002; Cory *et al.,* 2013; Guilarte *et al.,* 2012). Pb exposure was believed to occur during childhood or adolescent, and even during the prenatal period (Opler *et al.,* 2008; Stansfield *et al.,* 2015). The mechanisms were believed to be related to dysfunction of hypothalamic pituitary adrenal (HPA) stress system (Rossi-George *et al.,* 2009) or due to an imbalance of brain neurotransmitters (Ruocco *et al.,* 2015; Stansfield *et al.,* 2015). The aim of this study was to examine the potential influence of blood Pb as one of the risk factors among schizophrenic outpatient at one of the tertiary hospitals in Kuala Lumpur, Malaysia.

METHODS

This was a case-control study that has been conducted at a tertiary teaching hospital in Kuala Lumpur. It was matched based on the age group between case and control groups. A total of 50 schizophrenia cases was enrolled in the study that obtained from the hospital psychiatric outpatient clinic, and the similar amount of 50 controls was recruited among non schizophrenic patients. Respondents were free from all common chronic diseases like diabetes mellitus, hypertension, and coronary diseases. Patients who cannot communicate or in the active stage of schizophrenia will not included. The consent form was rectified and signed by the respondents themselves. A simple questionnaire was used to obtain their demographic and socioeconomic history. All respondents were asked to donate about 3ml of their blood taken from the cubital fossa by trained phlebotomists into 3ml EDTA vacutainer. Later the blood samples were digested using Triton-X 3% and send for Pb analysis using a Graphite Furnace Atomic Absorption Spectrophotometer with level of detection of 0.1 µg/dL. The software SPSS 20.1 was used during data entry and analysis with the significant point of $p<0.05$.

RESULTS

At the end of the study, about 50 cases of schizophrenia and 50 controls of non-schizophrenia respondents were enrolled in equal number (Table 1). Women respondents were greater in number compared than men in both groups. More than 50% of respondents in both groups were aged less than 40-year-old. Case group showed a lower monthly household income compared to the control respondents. More than half of case group respondents has income less than RM500 per month compared to the case respondents. About one third of respondents in the case group have a history of smoking, either active or former smokers. Majority of control were never smoke

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Table 1. Characteristic of respondents

Variable		Case (%)	Control (%)
Frequency		50 (50)	50 (50)
Gender	Male	24 (48)	12 (24)
	Female	26 (52)	38 (76)
Age group (year)	18 – 30	16 (32)	22 (44)
	31 – 40	21 (42)	10 (20)
	41 – 50	8 (16)	9 (18)
	> 50	5 (10)	9 (18)
Monthly Household Income (MYR)	Less 500	30 (60)	14 (28)
	500 – 1500	17 (34)	20 (40)
	1501 – 2500	2 (4)	8 (16)
	> 2500	1 (2)	8 (16)
Smoking history	Yes	18 (36)	4 (8)
	No	32 (64)	46 (92)

MYR = Malaysia ringgit

Table 2. Bivariate analysis between the case vs control group

Variable	Case (n=50)	Control (n=50)	Test
Age (mean) ± SD	35.70±9.96	34.70±12.64	p=0.661
Household income (MYR) ± SD	513.46±743.17	1425.32±2330.87	p=0.010*
Smoking history (yes)	18 (36%)	4 (8%)	p=0.001**
Serum Pb (geometric mean ± SD) (µg/dL)	4.73±1.67	3.36±1.69	p=0.007**

MYR = Malaysia ringgit; SD = standard deviation
*p<0.05; **p<0.01

before. Both case and control groups were comparable based on their age (t=0.439; p=0.661) (Table 2). However, the case has lower monthly income compared to the control group (t=2. 636; p=0.01). Those in the case group have a higher proportion of positive smoking history compared to the control group (χ^2=11.422; p=0.001). In addition, the case group respondents were also having a higher mean serum Pb compared to the control respondents, 4.73±1.67µg/dL and 3.36±1.69 µg/dL respectively. The difference was significant (t=2. 737; p=0. 007).

DISCUSSION

The study revealed that schizophrenic patients have low monthly household income. This poor earning capacity of schizophrenic patients was also established in other studies (Bhavsar *et al.,* 2014; Davidson *et al.,* 2015; Trani *et al.,* 2015). Smoking is one of bad habits that present among the cases in this study. It can interfere with the treatment and lead to poor recovery (Parikh *et al.,* 2016; Smith *et al.,* 2016). This study has identified smoking as the associated factor for schizophrenia that need to be handled wisely by psychiatrists as mentioned by other studies (Dickerson *et al.,* 2016; Li *et al.,* 2016; Nunez *et al.,* 2015). Serum Pb was recognized to be elevated among the schizophrenia compared to non-schizophrenia subjects in this study. This is the first toxicology study ever been carried out in Malaysia. The result was equivalent to other studies and reviews that correlate blood Pb and schizophrenia (Abazyan *et al.,* 2014; Arinola *et al.,* 2010; Liu *et al.,* 2013; Stansfield *et al.,* 2015).

Conclusion

The finding indicated that blood Pb as one of risk factors for schizophrenia. In spite of regular treatment, the physician needs to monitor patients' blood Pb for a better response and outcome of the antipsychotic drugs.

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