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Knowledge of inhalant abuse among selected nonresidential secondary school students in Kepala Batas, Penang

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Abstract: Inhalant abuse among teenagers age under eighteen years old are still active even the unhealthy activity has occurred for the past two decades. There are many death cases have been reported worldwide due to inhalant abused. Limited information on inhalant abuse effect among teenagers was leading them to abuse it. Current with the problem, a study to assess the knowledge level on inhalant abuse among teenagers was conducted among secondary school students in Kepala Batas, a district in northern Peninsular Malaysia. The aim of this study is to assess the knowledge level on inhalant abuse among secondary school students in Kepala Batas, Penang. 562 students (male and female) were selected systematically from six non-residential schools in the district. Having obtained consent from the schools and parents, the students answered a self-administered questionnaire on inhalant abuse and its effects. The study found that less than 10% of students had good knowledge on inhalant abuse. Male students seemed to have better knowledge on inhalant abuse compared to the female students with *p*-value was 0.03. There was a significant mean different between religion and knowledge levels on inhalant abuse with *p*-value were 0.01. Although the students' level of knowledge and awareness on the dangers of inhalant abuse was relatively low, they are of the opinion that legal action and activities to heighten awareness is very important to curb the problem of inhalant abuse.

Key words: Inhalant abuse; Questionnaire; School students; Peninsular Malaysia; Knowledge level

1. Introduction

Inhalant abuse is refers to the intentional breathing of gas or vapours with the purposed of reaching a high or delusion effect. According to Dorland Medical dictionary (2008) the inhalant is a process of taking substance involve respiratory system through mouth or nose or both channel. Inhaling the product directly through nose is known as sniffing or snorting. Meanwhile the term used for taking the product through mouth is known as huffing (William and Storck, 2007). Inhalant substance can be classified into several groups based on chemical structures, forms (liquid, gas, vapour or aerosol), product types (fuels, anesthetics, cleaners, glues, aerosol products) and Pharmacological properties (Baster et al., 2009).

Inhalant continues to be a poorly recognizable risk for morbidity and mortality globally. However, the report of abused has been reported from different regions of the world. Different products contain different types of chemical substance and the health effects of its exposure to the body is also different. In the United States, the practice of inhalant abuse has been spotted as early as 1959 and the community has been exposed to the dangers of this practice ever since (Scott, 2012). These substances, assume a greater significance as most of the user tend to be younger children and adolescents. The onset has been reported among children as young as 5 to 6 years (Balhara et al., 2011).

The practice of inhalant abuse is not something foreign in all over the places. In Malaysia, popular term that describes the act of inhalant abuse is sniffing glue. The availability of the products as household products such as aerosol insert killer, glue adhesives, detergents, stationery and beauty products were make it easily accessible to the teenagers. Teenagers who abused inhalant products believed that the inhalant is to be harmless way of "getting high", make them feel calm and hallucinate (Haslina et al., 2008). An individual who repeatedly abused inhalant will tend to continue the activity in the future.

Nearly all the abuse product types results; similar to anesthetic effect, which slow down the body's function. The user will experience slight stimulation, feeling of less inhibition or loss of consciousness depending on the amount of dosage consumed (Shelton, 2009). Presence of chemical substances such as toluene, benzene, heavy metal contents such as cadmium, chromium, iron, zinc, titanium and argentum in the adhesive glue (Rahim and Raizul,

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2009) can cause serious health effects. According to National Inhalant Prevention Coalition (2012), the inhalant abuse may lead to adverse effects to the brain, cerebral cortex, cerebellum, ophthalmic nerve, blood, lungs, heart, liver, kidney, muscle, bone marrow and peripheral nervous system.

Sudden sniffing death syndrome (SSDS) is a very suffering condition that might experience by inhalant abuser. SSDS refers to a condition whereby the users can die in the first attempt, tenth or hundred times they abuse inhalant substance. In a study of 12 fatalities, eight deaths were due to suffocation by a plastic bag and two cases death was presumed to be caused by intoxication (Saravesvaran, 1994). In year 2000, the case of glue sniffing has been noted down by media and highlighted in Malaysia newspapers widely. This issue rose because of three teenagers aged eighteen to twenty years old were found dead near school in Cheras Kuala Lumpur and police found three cans of glue nearby. Reported by News Straits Times (2005). On 17th of January 2007 newspaper (Utusan Malaysia) reported that two groups of teenager from 10 to 18 years old gathering together to sniff glue at a playground had been caught by the policemen. In Britain, the number of deaths recorded over a 20-year span (1971 to 1991) were 1,237 cases and in Australia from 1980 to 1987, there were 121deaths reported (Askie et al., 2011).

The arising of the issue was alarming parents and authority agencies were urged to take quick action to prevent the problem from becoming worsened. Based on studies conducted by Haslina et al. (2008) and Brian E. Perron & Matthew O. Howard, (2009) claimed that the children did not aware of the danger of the inhalant abuse effect to their health. Both studies conducted were involved children who had abused the inhalant products and the participants in the studies are still receiving treatment at rehabilitation centers. Most of the children and parents did not aware about the risk possess by chemical in household products (Lajis, 1996). The children and parent do not know about the routine household products contained chemicals which can put themselves on the risk of health effect problems if not properly store or misused (Yacob and Zinalibdin, 2009).

Lack of knowledge on inhalant abuse among school students put them on the risk to abuse the inhalant products. Increasing the case of inhalant abuse among children in Malaysia was put the teenager in danger and fast action has to be taken to curb this problem. So, a study that focused on assessing knowledge level among secondary school students toward inhalant abuse has been conducted.

2. Methodology

2.1. Participants

Ethical approval for the project was obtained from the Human Research Ethics Committee of Universiti Sains Malaysia (USM) and Malaysia Research Department at Ministry of Education. Cross-sectional study has been conducted in six selected national secondary schools in Kepala Batas, Penang. Inclusion criteria include daily schools, national secondary schools and the student must be literate. The exclusion criteria include religious school and full boarding school. Data had been collected from March to July 2013. The studied involved both male and female students. For each school, male and female had been selected with the ratio 1:1 and total secondary schools students participate were 562. Determination of sample size was referred to the previous study conducted by Brian E. Perron & Matthew O. Howard, (2009). Estimated proportion of inhalant abuse among male youth was 0.254.

2.2. Data collection procedure

A self-administered Malay language questionnaire on Inhalant and drug abuse developed by National Poison Centre, USM was modified for the study. The questionnaire contents were validated by statisticians, expert personals from National Poison Centre and Advanced Medical & Dental Institute, USM. The modified Questionnaire had been pilot-tested on a selected school with 30 participants in order to obtain feedback from the students in observing their understanding on the questions. The data were analyzed and reliability analysis was done with the questionnaire to assess item correlation and internal consistency. A reliable test was measured by its Cronbach's alpha and coefficient (Aday and Cornelius, 2006). The modification of questionnaire was made to fit with the objectives of the study. Students who participate in the study were systematically selected by using sequence of numbers. The multiples of five (5, 10, 15, 25) was the method had been used in selecting the students based on the list name that provided by schools administration. Method of selection was modified from Otiena AO and Avo Ofulla (2009); Guy LR (1981). Only the questionnaire with permission from parents and school authority were considered as completed questionnaire. All the personal details about the students and parents remained confidential.

2.3. Methods of analysis

The measurement scale that being used in this study were "Yes" equal to 1 score, "No" equal to 2 score and "Not sure" equal to 3 score points. Determination of Knowledge score level has been (Kasundu et al., 2012) with modification to fit with the research objectives. Knowledge level had been classified into good knowledge, intermediate knowledge, poor knowledge and very poor knowledge. The classification of knowledge level was referred to the number of questions which the students answered correctly. There were 21 out of 23 questions constructed in ordered to assess knowledge level among students. Good knowledge

score were given when the students can answer ≥ 80% out of 21 questions correctly by tick "Yes" on the questionnaire. Intermediate knowledge score were given when the students can answer ≥ 50% but < 80% out of 21 questions. Poor knowledge score were given when ≥ 30% but <50% out of 21 questions. Very poor knowledge score were given when students can answer < 30% out of 21 questions.

Descriptive statistics such as: mean and standard deviation for continuous variables, percentages for categorical variables; Independent t-test to compare continuous variables between groups. One-Way ANOVA was applied for statistical analysis to compared mean more than two independent variables. *P*-value <0.05 will be considered as statistically significant for all tests. IBM SPSS Statistics for Windows, Version 20.0 was used for analyzing all the data obtained.

3. Result

3.1. Knowledge level among secondary school students on inhalant abuse

Knowledge score was presented in percentage. Fig. 1 Shows 9.9% for good knowledge, 47.1% Intermediate knowledge, 33.9% poor knowledge and 9.2 % very poor knowledge. This data represent for the whole sample size which n=562 students.

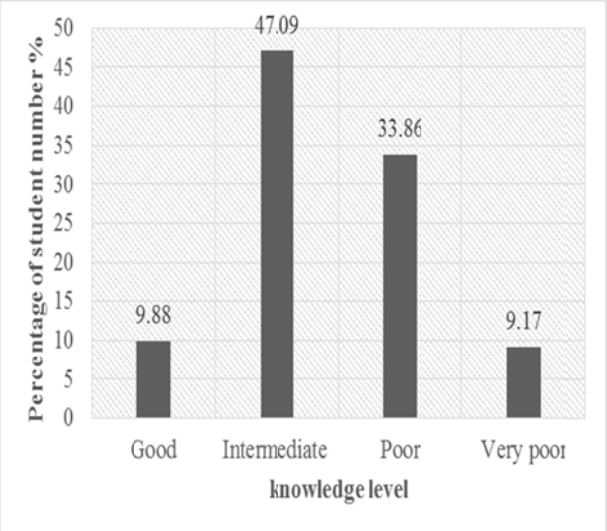

Fig. 1: Percentage of knowledge level among secondary school students on inhalant abuse

3.2. Percentage on basic knowledge, health effect and law amendment on inhalant abuse activity

Fig. 2 shows the distribution of students' response to the questions in the questionnaire. For basic knowledge of inhalant abuse, 29.0% answered "Yes" on the questions given and 71.0% answered "No". 36.4% of students answered "Yes" on health effect of inhalant abuse and 63.4% answered "No". For law amendment to be enacted by the government, 83.3% answered "Yes" and 16.7 answered "No".

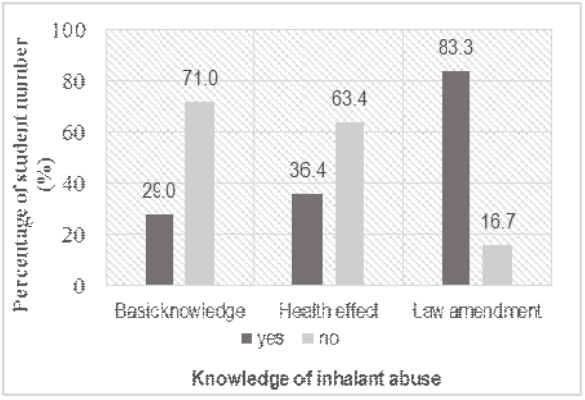

Fig. 2: Distribution of students' response to the questions in the questionnaire on inhalant abuse activity

3.3. Association of gender with knowledge level on inhalant abuse

Table 1: Association of gender with knowledge level on inhalant abuse

	Mean± SD of knowledge	*p*-value	95% CI value	
Parameters			Low	High
Gender				
Male	1.97±0.41	0.03	0.10	0.02
Female	2.00±0.36			

t- Independent Sample Test(t-test) was applied

Table 1 Shows that there is a significant different in mean between male and female with *p*-value obtained is 0.03. Hence, mean for female is higher by 0.03 compared to male.

3.4. Association of education level with the knowledge level on inhalant abuse

Table 2: Association of educational level with knowledge level of the inhalant abuse

	Mean± SD of knowledge	*p*-value	95% CI value	
Parameters			Low	High
Education				
Upper Secondary	1.97±0.39	0.92	0.01	0.03
Lower Secondary	2.00±0.38			

t- Independent Sample Test(t-test) was applied

Table 2 Shows there is no significant different in mean between upper and lower secondary school students on knowledge level with p value is 0.92.

3.5. Association of race, religion, guardian and age on knowledge level of inhalant abuse

Table 3 Shows the mean of knowledge of inhalant abuse is significantly different among religion with p-value obtained is at 0.01. Moreover, Post-Hoc test (Bonferroni procedure) was used and result has shown that Islam, Buddha, and Hindu have significant different among them (*p*-value is <0.05). There are no significant different of mean of knowledge level between race and guardian.

Table 3: Association of socio-demographics with knowledge level of inhalant abuse

	Mean± SD of knowledge	*p*-value	95% CI value	
Parameters			Low	High
Race				
Malay	1.99±0.37	0.07	1.95	2.01
Chinese	1.92±0.30		1.81	2.03
Indian	2.17±0.52		2.00	2.35
Other	1.65±0.15		1.29	2.01
Religion				
Islam	1.98±0.37	0.01[b]	1.95	2.01
Buddha	1.88±0.28		1.78	1.98
Hindu	2.21±0.50		2.02	2.40
Christian	2.30±0.38		1.66	2.95
Guardian				
Parent	1.99±0.37	0.56	1.96	2.02
Mother	1.96±0.41		1.84	2.08
Father	1.82±0.43		0.75	2.90
Other	2.14±0.65		1.61	2.70

[a] One—Way ANOVA was applied
[b]Post-hoc test (Bonferroni) was applied

4. Discussion

Inhalant abuse is an unhealthy activity and must be prevent from affected to our adolescent. Lack of knowledge on inhalant products and the health effects can put our teenagers in danger. The finding demonstrates that less than 10% out of 562 students have good knowledge on inhalant abuse activity. Very low percentage is showing that, most of the students do not aware about inhalant abuse activity and its health effect. According to Haslina et al. (2008), most of the adolescents' age getting involved in the inhalant abuse was 12 to 15 years old. At this age, the adolescents were easily getting influenced from their friends to get involved in the inhalant abuse. They will ignore the side effects of abusing this product to their health as long as they can be with their friends. The euphoria effect of the inhalant substances can lead adolescent to abuse again and again after the first trial (Baster et al., 2009).

The questions in the questionnaire were divided into three main sections. The first section of question was focusing on the definition of inhalant products, types of chemicals contained in the inhalant products, and methods of abusing inhalant products. Second section focused on side effects of the inhalant abuse activity to the health, chances to get other diseases, and risk to cause burning and explosion. Last section was focused on the perception toward inhalant abuse activity and of opinion amendment of specific law toward inhalant abuse by the government. The finding demonstrates 29% out of 562 students having basic knowledge of inhalant abuse and 36.4% having knowledge on health effect of inhalant abuse. Based on the result obtained, the knowledge level on basic knowledge of inhalant abuse activity and health effect among students were very low. Even though the knowledge level on inhalant abuse activity was low, 83.3% of students agreed to the opinion of amendment of specific law against inhalant abuse and the activity were considered as bad activity. There are 16.7 % of students were not agree with the amendment of law against the inhalant abuse. The 16.7 % of students who disagree with the amendment of law could possible still active in this activity.

Based on the result obtained shown that there were significant different in mean of knowledge level on inhalant abuse between male and female with *p*-value is 0.03. Hence, the male students are getting more exposure about inhalant abuse activity compared to the female. 31% males and 8% females out of 554 study subjects' age of 15 years old street children were involved in substance abuse in India (Bal et al., 2010). 54% male and 49.2% female out of 697 study subjects used inhalant to get high in rural Alaska, USA (Driscoll et al., 2012). The finding shown that the male students exposed to the inhalant abuse activity and abused it was higher compared to the female students. Peer pressure is one of the main factor lead the teenagers to misuse inhalant products (Asadollahi et al., 2011). Low price and easy access to the inhalant products were increased the inhalant abuse among adolescents.

Level of education at secondary school student in Malaysia is classified based on age. Age of 13 to 15 years old were classified as lower secondary meanwhile 16 to 17 years old were classified as upper secondary school students. Based on the result obtained shown that there is no significant mean different between knowledge level with upper and lower secondary school students on inhalant abuse with *p*-value is 0.92. Based on the result, level of knowledge on inhalant abuse between lower and upper secondary school students are the same. Both groups have equal risk to get involved in the inhalant abuse activity. Brian E. Perron & Matthew O. Howard (2009) reported 38.6% of children age 11 to 16 years old at Recovery Youth Centre USA have experienced misuse volatile substance in their lifetime. From the finding we can conclude that the age and level of education do not influence the students to abuse inhalant substances. A study conducted in Serian Serawak demonstrate that 53.2

% of respondent among inhalant abusers were age 10 to 15 years old and 38.7% were age 16 to 20 years old (Haslina et al., 2008). The finding shown that, there were different in percentage of involvement of the student in the inhalant abuse activity among students compared with the current finding. The study also highlight that the number of inhalant abuser decreased when they getting older because of availability and easy access to other product such as ecstasy, ice and other psychoactive drugs which is given longer euphoria effect compare to the inhalant substances.

Variety of religions practice in Malaysia was taken into account in this study as one part of the component to assess on inhalant abuse activity. There were four main religions practiced in this country such as Islam, Buddha, Hindu and Christian. Religions practices indirectly reflect the belief toward the inhalant abuse and perception of the students on inhalant abuse. The result shown that there were significant different of knowledge level between religion. Post Hoc Test had been used to identify the association within the religion and the result showed, Islam and Hindu had significant association with *p*-value is 0.008. Buddha and Hindu also had significant association with *p*-value is 0.006. Based on the result obtained, Islam and Hindu, Buddha and Hindu were influenced the knowledge level on inhalant abuse among secondary school students. Lack of study on religions toward knowledge level of inhalant abuse among secondary school students requires more studies in future either to support the current findings. The significant association of religions towards knowledge level on inhalant abuse could be due to lifestyle and belief toward inhalant abuse effect on health. Lacking of exposure and explanation about danger of inhalant abuse put children on high risk to involve in this problem.

There are no significant different of mean knowledge level between races with the *p*-value is 0.07. The current finding was shown that there is no association of races toward the knowledge of inhalant abuse among students. A study conducted by Baydala (2010) mention about the ethnicity does not affect the inhalant abuse activity among teenagers but income status and lifestyle was the main factor cause inhalant abuse in Canada. Miller et al. (2012) got a different finding which is American Indian youths use alcohol and other substances (marijuana, inhalants and methamphetamine) significantly higher rates than other ethnic youth groups. National Institute of Drug Abuse, USA (2011) also reported Hispanics have the highest rate of past-year inhalant abuse compared to both black and white ethnics.

Stay with both parents, single father, single mother and others were not give significant association of knowledge level among students on inhalant abuse with p-value was 0.56. The finding demonstrate contradict to the studies conducted by (Kendiri, 2005; Watson, 1980; Devathasan, 1994; Meadow, 1996) with being separated from family and parent divorce showed significant association with the inhalant abuse .90% of family neglected children and lack of supervision reported misused volatile substance in Egypt (Elkoussi and Bakheet, 2011). Result obtained in the current finding contradict with previous study could be due to 90% of the students taking part in this study was staying with both parents.

There were several limitations to this study. Only literate students were allowed by the school administration to participate in the study with the reason of the reliability of result obtained. Only six eligible secondary schools were selected out of ten secondary schools in Kepala Batas, Penang. This is due to the rest of other schools were not fulfil the requirement of the study according to the socio-demographic factors. Form six students were excluded from the study because only two schools having form six students and the data obtained will not represent for the accurate population.

There are few methods can be used to help in preventing inhalant abuse from becoming severe threat to adolescent. Among the methods is continuous campaign to secondary and primary school because at this age, students were tending to try anything in their life. Peer pressure influenced was reported to be the highest rate to attract children to abuse the volatile substances. Early campaign and explanation of the negative effect on health to school students must be carried out actively. Collaboration with Higher Education Institution, National Poison Centre, National Drug Agency, Ministry of Health and Ministry of Education were needed to provide education and awareness to the parents and school students about short term and long term health effect of inhalant abuse activity.

Further study with large population can be proceeded to see the overview of knowledge level among secondary school students in Malaysia. Determination of knowledge level among parents about inhalant products, sign and symptoms of their children being involve in this bad activity are recommended because most of the previous study reported that the parents did not aware about this issue. They did not aware about the household products that commonly used contained volatile solvent which posed high risk to being abused by their children.

5. Conclusion

The self-administrated questionnaire conducted on six selected eligible schools in Kepala Batas, Penang with the sample size 562 secondary school students can be concluded that less than 10% of student in Kepala Batas had good knowledge on inhalant abuse. Less than 30% out of 562 students having basic knowledge of inhalant abuse and less than 40% had having knowledge on health effect of inhalant abuse. There 16.7% of the participant were not agree with the amendment of law against the inhalant abuse activity. The demographic factors such as genders and religious showed significant

different with inhalant knowledge level with *p*-value < 0.05. Upper secondary, lower secondary, age, races, stay with were not shown significant association with inhalant knowledge among school students.

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References

Aday, L, A, & Cornelius, L, J (2006). Designing and Conducting Health Survey, A comprehensive Guide, 3rd Edition. San Francisco: Jossey-Bass.

Asadollahi, A., Ahmad, N., Hossein-Zadeh, A-H. &Faraji, N.(2011). Volatile substance Use within Aged population of Ahwan City/Iran, Epidemiologic View. *Middle-East Journal of Scientific Research*, 8(1), 244-252.

Askie, L.M., Ballard, R.A., Cutter, G.R., Dani, C., Elbourne, D., Field, D., Hascoet, J.M., Hibbs, A.M., Kinsella, J.P., Mercier, J.C., Rich, W., Schreiber. M.D., Wongsiridej, P.S., Subheader, N. V., Van Meurs, K.p.,Voysey, M., Barrington, K., Ehrenkranz, R.A. & Finer, N.N. (2011). Inhaled nitric oxide in preterm infants: an individual-patient data meta-analysis of randomized trials. *Pediatrics*, 128(4), 729-39.

Bal, B., Mitra, R., Mallick, A.H., Chakraborti, S. & Sarkar, K. (2010). Nontobacco substance use, sexual abuse, HIV, and sexually transmitted infection among street children in Kolkata, India. *Substance Use Misuse*, 45(10), 1668-82.

Balhara, Y.P., Verma, R. & Deshpande, S.N. (2011). A comparative Study of Treatment-seeking Inhalant Abusers Across Two Cohorts from a Tertiary Care Center in India. *Indian Journal Psychology Medicine*, 33(2), 129-33.

Balster, R. L., Cruz, S.L., Howard, M.O., Dell, C.A. & Cottler, L.B. (2009). Classification of abused inhalants. *Addiction*, 104 (6), 878-882.

Baydala, L. (2010). Inhalant abuse. *Pediatric Child Health*, 15(7), 443-54.

Bosco Kasundu, Moses Mutua Mutiso, Paul Sutter Chebet and Priscillah Wanjiku Mwiringi (2012). Factors Contributing To Drug Abuse among the Youth in Kenya: A Case of Banburi Location. *Elixir International Journal*, 46(2012) 8259-8267.

Brian. E. Perron and Matthew O. Howard, (2009). Adolescent inhalant use, abuse and dependence. *Journal of the Society for the study of Addiction*, 104, 1185-1192.

Devathasan, G., Low, D., Teoh, P.C., Wan, S.H & Wong, P.K(1994). A complication of chronic glue (toluene) abuse in adolescent. *Australian and New Zealand Journal of Medicine*, 14, 39-43.

Dorland's Illustrated Medical Dictionary (2008), 32th Edition, Philidelphia: Saunders.

Elkoussi, A & Bakheet, S.(2011). Volatile substance misuse among street children in Upper Egypt. *Substance Use Misuse*, 46 Suppl 1, 35-9.

Guy LR. (1981) Educational Research: competencies for analysis and application. Charles Mairill Publishing Company A. Bell & Howell company Columbus, Toronto, London

Haslina H, Abdul MA, Elena G, Chin F and Regina G, (2008). Kajian Remaja dan Penyalahgunaan Inhalan Di Daerah Kuching, Sarawak. *Journal of the Antidadah Malaysia*, 1-36.

IBM Corp. Released 2013. IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY:IBM Corp.

Kinder, N.U. a. Y. (2005). Clinical, socio-demographic, neurophysiology and neuropsychiatric evaluation of children with volatile substance addition. *Blackwell Publishing Ltd* 31,4, 425-432.

Meadow, R.a.V. (1996). Medical complication of glue sniffing. *Southern Medical Journal*, 89, 455-462.

Miller, K .A., Stanley, L.R. & Beauvais, F. (2012). Regional differences in drug use rates among American Indian youth. *Drug Alcohol depend*, 126(1-2), 35-41.

Otieno AO and AVO Ofulla. (2009). Drug Abuse in Kisumu Town Western Kenya. *African Journal of Food Agricultural Nutritional and Development*.3 (2009), 846-858.

Patra, S. Mishra, A. & Shukla, R. (2011). Inhalant abuse: A cause for concern. *Indiana Psychiatry Journal*, 20(1), 61-3.

R. Sarvesvaran and Hasnan J, (USM)(1994). Solvent abuse: a case report and a review. *Malaysian Journal Pathology*, 1 (16(2), 167-171.

Razak, L. (1996) National Poison Centre, Universiti Sains Malaysia.

Scott, K.D. & Scott, A. A. (2012). An examination of information-processing skills among inhalant-using adolescents. *Child: Care, Health and Development*, 38 (3), 412-419.

Shelton, K. L. (2009). Discriminative stimulus effects of inhaled 1,1,1-trichoroethane in mice: comparison to other hydrocarbon vapors and volatile anesthetics. *Psychopharmacology (Berl),* 203 (2), 431-40.

Singapore Government, Central Narcotics Beraeu (2012) Drug and Inhalant Abuse http://www.cnb.gov.sg/.

Utusan Malaysia. 17 January 2007, Remaja Hidu Gam Semakin Berani.

Watson, J.M. (1980). Solvent abuse by children and young adults. *British Journal of Addiction*, 75, 27-36.

William, J.F.& Storck, M. (2007). Inhalant abuse. *Pediatrics*, 119 (5), 1009-1017.

Yaacob, A.R. & Zinalibdin, M.R. (2009). Characterization using instrumentation of local glue related glue sniffing activity. *Indian Journal of Forensic Medicine & Toxicology*, 3(2), 58-64.