

A Review of Smoking Research In Malaysia

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ABSTRACT

Two hundred and seventy one original published materials related to tobacco use were found in a search through a database dedicated to indexing all original data relevant to Medicine and Health in Malaysia from 1996 - 2015. A total of 147 papers were selected and reviewed on the basis of their relevance and implications for future research. Findings were summarised, categorised and presented according to epidemiology, behaviour, clinical features and management of smoking. Most studies are cross-sectional with small sample sizes. Studies on smoking initiation and prevalence showed mixed findings with many small scale studies within the sub-groups. The majority of the studies were related to factors that contribute to initiation in adolescents. Nonetheless, there are limited studies on intervention strategies to curb smoking among this group. There is a lack of clinical studies to analyse tobacco use and major health problems in Malaysia. In addition, studies on the best treatment modalities on the use of pharmacotherapy and behavioural counselling have also remained unexplored. Reasons why smokers do not seek clinic help to quit smoking need further exploration. A finding on the extent of effort carried out by healthcare providers in assisting smokers to make quit attempts is not known. Studies on economic and government initiatives on policies and tobacco use focus mainly on the effects of cigarette bans, increased cigarettes taxes and the influence of the tobacco industry. Recommendations are given for the government to increase efforts in implementing smoke-free legislation, early and tailored interventions. Clinical studies in this area are lacking, as are opportunities to research on ways to reduce smoking initiation age and the most effective quit smoking strategies.

KEY WORDS:

Smoking, Review, Malaysia, Risk Factors, Initiation, Cessation

INTRODUCTION

Studies on smoking related material were reviewed to cover epidemiology, behaviour, clinical features and management of smoking. We conducted an extensive literature search in a database dedicated to indexing all original data relevant to Medicine and Health in Malaysia from 1996 to 2015 using the medical subheadings MeSH 'Smoking; Tobacco Use; Tobacco Smoke Pollution; Tobacco Use Cessation; Tobacco Use Disorder; Smoking Risk Factors; Smoking Initiation; Smoking Cessation, Malaysia'.

Of these, we initially reviewed 259 articles, 8 reviews, 4 theses, 4 books and 2 case studies. A total of 147 papers were selected and reviewed on the basis of their clinical relevance and implications for future research.

In this review, all types of studies were considered including journals articles, conference proceeding, guidelines and reports, single case studies, case series reports and reviews. The study design for most articles that were reviewed was cross-sectional using questionnaire survey targeting adolescents at schools and university students. A significant few were follow-up studies, intervention and population studies and smokers from specific groups (female smokers, health staff, civil servants, etc.) as well as smokers attending quit smoking clinics.

This review aims to examine the published studies conducted in Malaysia from 1996 to 2015. It is expected to provide an overview of research interest, its contribution to current practices and identify gaps in smoking research in Malaysia.

SECTION 1: REVIEW OF LITERATURE

EPIDEMIOLOGY

Smoking Prevalence

In Children and Adolescents

In Malaysia, there are 5 million smokers who are classified as children or adolescents younger than 18 years old as of 2010.¹ By 2015, 1 in 10 Malaysians in the 13 to 17 year old age group were smokers.² The prevalence of cigarette smoking among male secondary school children was 33.2% who were current smokers³ or within the ranges 29.7 to 43.0%,⁴ with a male to female proportion of 63.5% to 17.5%.⁵ This is consistent with the highest prevalence of smoking found among schoolboys from the vocational schools.⁶ In a longitudinal knowledge, attitude and practices study among form 5 students over 1 year, the prevalence decreased from 29.7 to 26.7% after a year.⁷

The prevalence of smoking among secondary school students in Sarawak is 32.8% although the majority (96.9%) did not smoke on a daily basis.⁸ The prevalence of smoking was 22.8% among Form 6 students in the Petaling District, Selangor.⁹

In a study among primary school children in Tumpat, Kelantan, the reported smoking prevalence was 11.8%. Of these, 3.8% were current smokers.¹⁰ In a study of 190

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secondary four male school students from three schools in Kota Bharu, 57 (30.0%) students were current smokers, 45 (23.7%) students were ex-smokers and 88 (46.3%) reported never smoking cigarettes.¹¹ Overall prevalence of smoking was 6.7% amongst Malay adolescents in Kota Bharu.¹²

The prevalence of future intention to smoke among adolescents current smokers was 10.7%.¹³ The estimated prevalence of self-reported cigarette smoking among private university students was 10.3 to 29.0%.^{14,15}

Smoking prevalence among lower secondary students of schools located in the Federal Land Development Authority (FELDA) settlement areas (42.9%) was two-fold higher than in the rural and town schools combined (20.3%)¹⁶ and confirmed by other studies.^{4,17} This situation will contribute to high smoking-related health problems in the future if proper preventive measures are not taken accordingly.⁴

In Adults

The prevalence of current smoking among adult males in 2006, in Malaysia is 46.5% (95% CI: 45.5–47.4%), which was 3.0% lower than a decade ago.¹⁸ The prevalence of current smoking among both male and female Malaysian adults aged 15 years and above is 23.1%,^{19,20} and is highest in those aged 21-30 years old.²¹ There has been several series on nationwide surveys in Malaysia, starting with the National Health and Morbidity Survey in 1986 (NHMS I), NHMS II in 1996 and NHMS III in 2006. Due to differences in working definitions used in these surveys, trends of tobacco use was not formulated. However between NHMS II (1996) and NHMS III (2006), the prevalence of adult current smokers aged 18 years and above declined from 24.8% to 22.8%. The prevalence of smoking remained at around 25% from 2011 to 2015 (One in two males were smokers).²

In the Elderly

The prevalence of smoking amongst the elderly (60 and above) was 39.2%. Smoking is highly prevalent (39.2%) among elderly males in Malaysia and is higher compared to the United States (12.0%) and China (26.0%).²²

Smoking and Gender

Being male has been significantly associated with tobacco use.^{23,24,25,26} The prevalence of smoking is higher in males than in females,^{5,7,12,17,27-31} with males starting smoking at younger age.^{7,32,30} One fifths of male adolescents smoke daily for more than three years.⁶

The prevalence of smoking in lower secondary school males was 35.5%.¹⁶ More than 50.0% of male students in secondary school were found to be smokers.⁴ The use of tobacco among adolescent girls is on the rise in Malaysia.³³

In a study of villagers from Kudat, 50.0% of males and 6.8% of females used tobacco products in the past 30 days.²³ A total of 46.6% of males were current smokers of which 15.4% were smoking more than 20 cigarettes per day and 67.9% got 40 pack-years and above.²³

Research conducted recently in Cambodia, Vietnam, and Malaysia suggests that gender norms and traditional values

make it difficult for women to influence tobacco use among men.³⁴ All of the Malaysian rural young women participants perceived that smoking was harmful to the health of the person who smoked. According to the young women, the amount of money their fathers spent on tobacco varied from as low as 5.0% to as high as 65.0% of the total household expenditure. Almost all of the female Malaysian participants were worried that the money spent on tobacco would reduce essential spending for food, health care, and education. One young woman expressed that “*spending part of the family’s income on tobacco is a selfish act.*”³⁴

Only half of the young Malaysian women who participated had tried to advise their father to smoke outside the house, typically unsuccessfully. The Malaysian fathers reported that they usually smoked anywhere and whenever they wished.³⁴

The main reason that men gave for not smoking inside the home was the concern that the smoke could harm their children’s health, as well as pressure not to do so by their children.³⁴ Creating a ‘smoke-free home’ assists in the preventing the initiation of tobacco use, promoting quit attempts and eliminating non-smokers’ exposure to second-hand smoke.³⁴ Having a mother who smokes is a strong risk factor for smoking initiation and significantly predicts ever and current smoking.³⁵

Socio-Economics and Smoking

The prevalence of smoking was highest among those with lower income,^{22,25,29} younger age,²⁵ unmarried status,^{1,21} with primary education,²⁵ type of occupation,²⁵ rural residence,²⁵ lifestyle (physical activity participation and nutrition label use) and health status (presence of comorbidities).²⁵

Smoking by Locality

In the series of the National Health and Morbidity Surveys (1996 to 2015), the prevalence of smoking is consistently higher in rural areas when compared to urban areas. From 1996 to 2015, smoking prevalence in rural areas have increased from 28.5% to 29.4% and 21.7% 22.3% in urban areas.²

Smoking among Health Staff

Future physicians who smoked recorded lower levels of knowledge on smoking (4.30 ± 2.17) compared to non-smokers (5.19 ± 1.28).³⁶

In assistant environmental health officer trainees, the self-reported current smoking rate (10.8%) was much lower than among the general Malaysian population (23.1%). The smoking rate was much higher than among medical students in Malaysia and the United Kingdom.¹⁹

The prevalence of pre-clinical medical students who had ever smoked was low. In terms of patient smoking habits, most students said they would not advise their patients to quit smoking. This attitude reflects their lack of adequate knowledge and skills to promote smoking cessation among future patients.³⁷

The prevalence of overall smoking in Malaysian dentists and periodontists was 4.4%.³⁶ Most dentists and periodontists

agreed that doctors, dentists, health workers and the family play an effective role in helping patients quit smoking. While 78.6% of periodontists advised all patients who smoked about smoking cessation programmes, only 34.7% of dentists did likewise.

In a study among staff of the Health Department of Melaka, the prevalence of smokers was 45.5 %, while 14.1% were ex-smokers (n = 313). Smoking was found to affect work performance, with an association between smoking status and respondent age, ethnicity, educational status, years of service and income.²⁷

Smoking among Teachers/ University/ Public Services Staff

The prevalence of smoking among staff at a public university was found to be 10.0% (26.5% among males and 0.5% among females).²⁹ The prevalence of smoking among school teachers in Malaysia was found to be 7.8%.²⁶ Multivariate analysis showed that gender and marital status were significantly associated with smoking among school teachers.²⁶ Among the reasons given by them on the need to start smoking was a need to relax (33.3%) followed by stress relief (28.2%).²⁶

There was a 37.6% of high nicotine dependence among male civil servants which was significantly associated with the number of cigarettes and frequency of smoking daily, smoking cues (such as feeling sad and lonely, waking up in the morning and while driving), smoking rewards (feeling accepted); smoking environment at workplace and home.³⁸

Smoking among the Public

Migrant workers were classifiable as current smokers (4.2%), past smokers (5.1%), never smokers (90.6%). Majority of migrant workers did not engage in risk behaviours such as smoking.³⁹

The prevalence of respiratory symptoms was found to be greater in current smokers among male quarry workers in Kelantan, Malaysia (tested using spirometric testing and detailed personal interviews).⁴⁰

A study among customers visited outdoor restaurants in Shah Alam showed peers were the main source of knowledge about harmful effect of smoking.⁴¹

BEHAVIOUR AND SMOKING

Factors Associated to Smoking in Adolescents

A triad of family, environment and individual factors synergistically act to motivate adolescents toward smoking.¹ Studies among secondary and primary school students have found consistent risks and intention to smoke in the future and is associated with having family/brothers and/or peer groups who smoke (p<0.01)^{3,6,9,10,16,18,27,28,32,42-49} and poor knowledge about the ill effects of smoking,^{5,7,10,18,50} male (p=0.025),^{5,9,10,14,42,47,50} age (p=0.037),^{5,10,14,42,50} education level (p<0.01),^{32,50} ethnicity^{5,47,50} religion,⁵ alcohol intake,⁹ economic status,⁵ upper primary school level (standard 4, 5, 6)^{10,42} semester of study (p= 0.025),¹⁴ positive attitude toward

smoking (p<0.001)^{5,7,14,50} negative attitude toward tobacco control policies (p<0.05)¹⁴ stress¹⁴ and the locality where respondents attended school [1.94(1.11-3.39)].^{16,43}

In a longitudinal study, a total of 14.9% of adolescents were susceptible to smoking at baseline.⁵¹ Respondents who were identified as susceptible to smoking were 3.7 times (95% CI: 2.17- 6.30) more likely to initiate smoking compared to non-susceptible respondents after adjusting for gender, school locality, percentage of friends who smoke, father smoking, parental acceptance of smoking, and belief in the positive and negative consequences of smoking.⁵¹ FTND revealed that 90.0% of current smokers who were lower secondary students had lower addiction to nicotine.¹⁶

Higher odds for smoking was observed for adolescents who perceived that their parents would react badly to smoking (aOR 0.84)^{3,47} or perceived public disapproval of smoking (aOR 0.93).^{46,120} Overestimates of the prevalence of smoking among their peers also predicted future smoking.^{52,118} Waiting for the bus (32.4%) was the most common occasion for smoking amongst secondary school students.⁵ The most prevalent risk behaviours include truancy (34.4%), loitering in public places (21.5%), bullying (14.4%), stealing (12.9%) and smoking (12.0%).⁵³ Females and non-smoker had better knowledge of the hazards of smoking and posed more positive attitudes.⁵

Factors given by upper secondary schoolboys for continuing smoking were stress (70.0%) and addiction to the nicotine (49.0%).⁴² The majority of them (91.3%) were aware that cigarettes are the main risk factor for lung cancer and but only about half believed that second-hand smoking is one of the risk factor of lung cancer.^{10,54}

Among the factors that hinder smoking cessations in adolescents include the environmental factors, behaviour of teenagers (personal factors), and poor self-efficacy in overcoming nicotine addiction (behavioural factors).⁵⁵

Factors Associated with Smoking in Adults

In adults, predictors of tobacco use include being of male gender,^{14,29,47,56,57} alcohol use, intravenous drug use,²⁴ age,⁵⁶ income, marital status,^{17,29} ethnicity, religion,²⁹ education level,^{29,32,56,57} peer influence,³² employment status,²⁹ residential area,⁵⁶ family income,²⁹ role in the family,⁵⁸ parental knowledge,⁵⁸ lifestyle, and health status.²⁵

The prevalence of ever and current smokers in Kelantan was 34.0% and 25.1% (p<0.001).³² A study carried out amongst smokers aged 60 years and above found that they had less knowledge, as well as poor attitudes and perception on the risks of smoking compared to ex-smokers and non-smokers.²²

Studies have shown that smokers rationalise smoking as a coping mechanism that them carry on with their life.^{14,59,60} About one third of smokers believe that they belonged to a light smoker category.⁶¹ Some smokers mistakenly believe that smoking water pipes were far less harmful than smoking cigarettes, both for themselves and for those exposed to the

smoke.³⁴ Lay beliefs may prevent some smokers from quitting.⁶² A comparative study reported nearly half of Malaysian smokers (49.1%) rationalizing their smoking compared to Thai smokers (9.5%).⁶³

Branded cigarettes are often preferred by smokers in Sarawak (83.1%), with cigarettes most commonly being obtained from either friends (49.1%), or self-purchased (43.6%).⁸

Intention to Quit Smoking

The prevalence of quit attempts ranges from below 20.0% to over 50.0% across countries (Australia, Canada, China, France, Germany, Ireland, Malaysia, Mexico, Uruguay, Netherlands, New Zealand, South Korea, Thailand, UK, US).⁶⁴

Only 11.3% of Malaysian smokers intended to quit within six months, whereas 20.8% of Thai smokers intended to quit. Approximately 3 out of 5 smokers in vocational school males had considered quitting and 45.0% of them had tried at least once to stop smoking.⁶ The percentage to quit smoking among current smokers in adolescents was 61.7%.¹³

A study showed that 66.7% of current smokers (villagers in Kudat) showed no intention to quit in the next 6 months.²³ The majority of smokers prior to the intervention were seriously planning on quitting (59.5% were at preparation stage), but over a third had no plans to quit (35.5% were at contemplation stage).⁶⁵

A community-based study on the prevalence and factors affecting cessation in Terengganu had recorded quit ratio of 27.0%.¹⁷ Quit rate at four months after intervention was significantly higher compared to the non-intervention group (45% vs. 32%) ($p=0.013$).⁶⁶

Smoking Initiation Age

In Malaysia, the mean smoking initiation age has been shown to be between 16.2 years to 18.3 years.^{18,67} The median age at smoking initiation was lower among males.²⁸ Smoking mean age among university students was 20.74 years.⁶⁷ The mean age of smoking initiation amongst secondary school students in Sarawak ranges from 12.8 years⁸ to 18.1 years.⁵⁶ In Hulu Langat, the mean smoking initiation age was between 13-15 years old (67.0%), while 21.0% of them begin smoking at below 12 years of age.⁴² Half (50.0%) of all smokers from a village in Kudat started smoking before they were 18 years old.²³ Overall mean initiation age in Terengganu for males (19.1 years) was significantly lower compared to 29.8 years for the females ($p<0.001$).

Duration of Smoking

The mean duration of smoking for the current smokers was 21.6 years (95% CI=19.1, 24).¹⁷ There was no significant difference between the mean duration of smoking between male and female current smokers ($p=0.59$).³² Smoking duration of Malaysian university students was 4.41 years.⁶⁷ The overall mean duration of smoking in Kelantan was 23.9 years with a median of 23 years.³² A total of 5.3% of villagers in selected Northern Borneo used chewable tobacco with median duration of 31 years.²³

Numbers of Cigarettes Smoked

There is an increasing trend in the number of cigarettes smoked per day from 13.4 in 1996 to 18.3 in 2015.² In a study comparing Malaysians and Thais, the mean cigarettes smoked per day for Malaysians averaged 13.7 sticks with Thais 13.2 sticks.⁶³ More than half (53.4%) of the current smokers smoked regularly (at least one cigarette daily).⁶⁸ Among those actively smoking, 96.7% smoked a lesser number of cigarettes during the fasting month.⁶⁹ Smoking frequency of Malaysian university students averaged 8.72 cigarettes per day.⁶⁷ A total of 46.6% of males (villagers in Kudat) were current smokers of which 15.4% smoked more than 20 cigarettes per day and 67.9% got 40 pack-years and above.²³ In another study examining health behaviours in a rural community, male smokers were found to smoke at least 5 cigarettes per day.⁷⁰ In Sarawak, one study found tobacco usage to be as high as 14 sticks per day.⁵⁶

Types of Tobacco/Nicotine Used

Electronic Cigarettes

According to the NHMS-4 (2015),² the consumption of smokeless tobacco use has increased to 21.4% among Malaysian males, up from a 1.0% usage based on the 2011 Global Adult Tobacco Survey.²¹ Awareness was higher among male, younger, more educated, and wealthier respondents. Awareness of e-cigarettes was 21.0% in Malaysia, with 3.9% of those aware being current e-cigarette users.^{71,72}

A qualitative study exploring the perspective of vapers on the effectiveness and safety of vaping showed, at least anecdotally, that vaping was used to assist them in quitting smoking.⁷³ Findings showed that vaping was used as a quit smoking aid which reduced tobacco consumption as a cheaper and healthier alternative device to nicotine to manage withdrawal symptoms.⁷⁴

Shisha Smoking

Shisha smoking is not adequately addressed in the current anti-tobacco policies. Shisha bars are commonly seen around educational institutions. The general public is unaware of the harmful effects of shisha smoking as it is generally assumed that shisha does not contain tobacco.⁷⁵

Influence of peers is the main factor to the first attempt in Shisha smoking. Other reasons that lead them to continue smoking Shisha include the smell and flavoured taste of Shisha, easy accessibility, and the perception that it is less harmful and cheaper than smoking.⁷⁶

Chewable Tobacco

Females in Kudat used chewable tobacco alone, while males reported using a variety of tobacco types: factory made cigarettes (79.3%), hand rolled tobacco (37.9%), chewable tobacco (6.9%) and cigars (3.4%).²³

Second-Hand Smoking

Avoiding second-hand smoking is a main preventive measure for lung cancer.⁵⁴ Four in ten adolescents were exposed to second-hand smoke.² A total of 442 (55.6%) children (primary school children) lived with at least a smoker in the household with mainly fathers who smoked.⁷⁷ Primary school students who were second-hand smokers showed no significant variation in PEFR levels ($p=0.816$).⁷⁸

In a group of housewives in a Malay community who were second-hand smokers in the privacy of their own homes, most were exposed to less than 10 cigarettes for less than 10 minutes per day.⁷⁹

Measures of Nicotine Dependence

Fagerstrom Test of Nicotine Dependence (FTND)

The Heaviness of Smoking Index (HSI) provides a similar prevalence rate of high nicotine dependence as the FTND.⁸⁰ The prevalence in the detection of high nicotine dependence was 7% lower using CPD recommendations.⁸⁰ The kappa inter-rater reliability between HSI and FTND has been found to be substantial ($\kappa=0.63$).⁸⁰ The sensitivity and the specificity of HSI was 69.8% and 92.5% respectively.⁸⁰

Carbon Monoxide (CO) Levels

In a study involving adult male smokers, exhaled CO was proved to be a useful tool in predicting nicotine dependence.^{81,82} Exhaled CO correlated positively with FTND scores (Pearson's $\rho=0.398$, $p=0.01$).⁸¹

CLINICAL FEATURES

Smoking in Association with Other Diseases

Smoking accounts for 15.0% of hospitalisations and 35.0% of inpatient hospital deaths in Malaysia. Smoking kills 20,000 Malaysians on a yearly basis.²

Respiratory

School children who are exposed to cigarette smoke have an increased risk for developing cough, nasal and throat problems at night, wheezing and asthma. The risk is increased with the increasing number of smokers at home.⁷⁷

In a study involving spirometric testing of university students, it was found that the predicted FEV1 levels had a significant inverse correlation to smoking frequency (number of cigarettes per day) ($r=0.241$, $p=0.016$).⁶⁷ FEV1% was a predictor of the age and smoking frequency of these students ($p=0.002$).⁶⁷ FEV1/FVC% was significantly associated with phlegm symptoms ($p=0.03$). The FEF_{25-75%} was related to age ($p=0.005$), height ($p=0.043$) and smoking duration ($p=0.046$).⁶⁷

Smokers who maintained abstinence were found to be less likely to develop respiratory symptoms and require lower hospital admission in a year compared to smokers (OR = 4.5, CI: 1.19 -10.59; $p<0.005$).⁸³

Among male farmers, there was a significant reduction of acute symptoms after pesticide spraying if they did not smoke.⁸⁴

Tuberculosis

TB patients who received an integrated intervention for six months were found to have significantly higher rates of quitting smoking when compared to those who received conventional TB treatment alone (77.5% vs. 8.7%; $p < 0.001$).⁸⁵

In a study related to smoking connecting TB and tobacco cessation interventions has been strongly advocated as this may yield better outcomes including better health-related

quality of life (HRQoL). Participants who received the integrated intervention had a better HRQoL than those who received the usual TB care.^{86,87}

In another study, ever smokers had increased likelihood of treatment failure (OR 7.48), defaulter rates (OR 7.17) and were less likely to be cured (OR 0.34).²⁴ There was a significant relationship between the smoking status of a TB patient with race and initial Mantoux test.⁸⁶

Smoking was found to be a significant risk factor in the development of TB among foreign labourers. Smoking behaviour was higher in females (50.5%) compared to males in this population (64%) ($p<0.05$).⁸⁸

Ever smoker TB patients have been found to be four times more likely to have slower smear conversion at two months compared to non-smoker TB patients.⁸⁶

Mortality rates among TB patients who smoke is high. Smoking has been identified as a risk factor for unfavourable outcomes among TB patients registered in DOTS pro-programmes in terms of therapeutic compliance.⁸⁶

Oncology

Smoking is one of the factors influencing regular medical check-ups in cancer prevention besides sex and family history of cancer ($p = 0.034$, $p=0.013$, $p=0.002$; respectively).⁸⁹ At a tertiary care setting, smoking was associated with an increasing trend of cancer cases.⁹⁰

Breast Cancer

In a study of female breast cancer patients in Kelantan, 4.6% were smokers.⁹¹

Oral Cancer

In most Southeast Asian countries, oral cancer is caused by smoking, betel quid chewing and alcohol consumption.⁹² The risk of developing cancer decreases after the cessation of tobacco use and the risk of developing oral cancer in an ex-smoker will be similar to an individual.⁹³ There is no difference in the risk of oral cancers among smokers/tobacco users who stop smoking within ten years.⁹³ It is thus important to offer effective treatment to help smokers stop smoking.⁹⁴

Other Cancers

In isolated cases of squamous cell carcinoma of the oesophagus, most patients (71.7%) gave a positive history of smoking.⁹⁵

Cardiovascular Disease and Diabetes

In a study which assessed the relationship between smoking and cardiovascular risk, it was found that the glycaemic index amongst males was significantly associated with smoking status ($p=0.048$).⁹⁶ This however did not translate to a significant association for smokers having the risk of developing diabetes mellitus compared to non-smokers despite smokers having a higher odd ratio (OR: 4.33; 95%CI: 0.900-20.811) ($p=0.068$).⁹⁶ In a univariate analysis, the duration of smoking was found to be a significant factor linked to diabetic nephropathy. This was not seen when a multivariate analysis was done.⁹⁷

In a study amongst non-ST elevation myocardial infarction patients at a tertiary centre, the incidence of bleeding after the commencement of anticoagulants (enoxaparin) was not significantly affected by age, enoxaparin dose and duration of therapy, smoking and concomitant aspirin/ticlopidine therapy.⁹⁸

Hypertension

Smoking 5 cigarettes was found to be significantly associated with high systolic blood pressure ($p = 0.036$).⁹⁶ Conversely, smoking seemed to indicate a protective trend against systolic hypertension (OR: 0.57; 95% CI: 0.266-1.230) but this finding did not achieve statistical significance ($p=0.152$).⁹⁶

Endocrine

There seems to be an inverse effect of smoking on obesity. A national study found the prevalence of obesity was significantly higher in a non-smoking population compared to a group of current smokers ($p<0.01$).⁹⁹ In smaller studies which shared a parallel trend, smokers within an indigenous tribe had a lower BMI compared to non-smokers.¹⁰⁰ However in an adolescent population, there was no association between BMI and smoking habits.¹²

Psychiatry

Current smokers experience a greater degree of anxiety compared to former smokers and non-smokers.¹⁰¹ One study conducted on smokers with schizophrenia recorded higher scores in measures that reflect immediate memory, delayed recall and recognition memory than non-smoker.¹⁰²

Reproductive

Exposure to second-hand smoke during pregnancy increased the maternal risk of delivering infants with cleft lip and palate (OR 2.41, 95% CI: 1.42-4.09).¹⁰³

In assessing the effects of passive smoking in mothers, a study revealed that maternal placental and neonatal parameters did not show any difference between the exposed and non-exposed group.¹⁰⁴ However, placental weight showed significant correlation with maternal weight and maternal BMI in both exposed and non-exposed mothers.¹⁰⁴ Placental weight in both Malay ($r=0.405$; $p=0.020$) and Indian ($r=0.553$; $p=0.050$) passive smokers were significantly correlated to maternal weight on admission.¹⁰⁴

In a study performed in 4 countries that included Malaysia, the odds ratio of erectile dysfunction amongst male smokers with no comorbidities was 2.3.¹⁰⁵

Gastroenterology

In a study evaluating the effect of smoking in peptic ulcer disease patients, there was a significant association between *Helicobacter Pylori* infection and smoking status.¹⁰⁶

Rheumatology

Two studies revealed the effects of smoking on bones and joints. The relative risk of developing hip fracture in a smoking population was 1.5 greater for men (95% CI, 1.0 -2.1).¹⁰⁷ Smokers had a greater risk of developing rheumatoid arthritis when compared to never-smokers (evidenced by positive anti citrullinated protein antibody - ACPA).¹⁰⁸ There was an dose-response relationship in terms of risk of developing rheumatoid arthritis.¹⁰⁸ A particular allele in the

Asian population (HLA DRB1*0405) was linked to the risk of developing rheumatoid arthritis through smoking.¹⁰⁸ Rheumatoid arthritis was also predominant in smokers with exposure to silica.¹⁰⁸

MANAGEMENT

Health Warnings on Cigarette Packs

Evidence shows that comprehensive warnings on cigarette packaging promotes cessations.¹⁰⁹ Messages about smoking habits that affect the appearance of the smoker was found to be more effective in teenage smokers.¹¹ However, health warning messages on cigarette packs do not appear to have much effect on child and adolescent smokers. The failure of this intervention is attributed to the facts that the latter group is known to purchase individual cigarettes instead of buying a whole pack.¹¹ In another study, the majority of children who smoked felt that displaying pictures associated with diseases pertaining to smoking did not have any deterrent on their smoking habits.¹¹⁰ However, they believe that the same cigarette pack warning might have the potential of creating awareness to quit smoking.¹¹⁰

Health warning messages on cigarette packs were found to increase awareness of the risks of smoking elicit stronger behavioural responses to the warning and increase interest in quitting smoking in adults.¹¹¹ This messages stopped smokers from having a cigarette and was independent predictor of all phases relevant to the stages of change theory.¹¹² It also predicts quit intentions and self-efficacy in quitting.¹¹ In addition, thinking about the health risks and reading the warnings added extra predictive capacity. This predictive potential was more predominant only in the early stages of contemplating change.¹¹² Cigarette pack warnings appeared to have a common mechanism for influencing quitting regardless of warning strength.¹¹³

Interventions

School Based

The current national tobacco control programme has been found to be ineffective in promoting smoking cessation among teenagers due to the inadequacy of the message content, lack of exposure to the programme, and poor presentation and execution.¹¹⁴

There were no differences between adolescents from Malaysia and Thailand in terms of reported anti-smoking education in schools and exposure to anti-smoking messages. The provision of anti-smoking education in school was associated with a reduced susceptibility in female smoking (OR = 0.26); higher knowledge of smoking harm and higher perceived health risks were associated with reduced susceptibility of smoking among Thai females (OR = 0.53) and Malaysia male adolescents (OR = 0.63).¹¹⁵ In the same study, male students indicated the belief that print media; OR = 2.32 (95% CI: 1.31-4.10); radio; OR=1.93 (95%CI: 1.15-3.22); and the internet; OR = 1.96 (95% CI: 1.15-3.33) were very effective at delivering anti-smoking messages.¹¹⁴ More Thai than Malaysian adolescents received advice from their doctors and nurses about the danger of smoking ($p>0.001$).¹¹⁵ However, studies will assist in the development an anti-smoking program to limit smoking in universities by implementing policies against smoking.¹⁴

Behavioural Intervention

Group counselling is very effective in improving smokers' knowledge and quit rate, but not their attitudes toward smoking.⁶⁶ Factors such as the number of counselling sessions, the amount of cigarettes smoked at baseline, adherence to NRT and pre-treatment stress are important considerations for success.¹¹⁶ In an intervention which also involved counselling, higher abstinence rate was reported in intervention group (71.7%) compared to a control group (48.6%) at 6 months follow up (CO verified) (OR = 0.375; 95% CI = 0.217-0.645, $p < 0.001$).¹¹⁷

A single session of brief physician counselling has been found to be effective in improving smokers' behaviour at the workplace, but the effect was not sustained.¹¹⁸ In this study, there was a significant improvement in smoking behaviour at one-month post intervention ($p=0.024$, intention to treat analysis; OR=2.525; CI=1.109-5.747). However, this was not significant at three-month post intervention ($p=0.946$, intention to treat analysis; OR=1.026; 95% CI=0.486-2.168).¹¹⁸

In a study involving intensive individual and group counselling on diet, physical activity and quitting smoking among security guards of the public university showed a significant reduction in their mean total cholesterol levels and the amount of cigarettes smoked compared to the control group.¹¹⁹ A similar study showed that the worksite is an effective channel for the adoption of the new lifestyle behaviours including stopping smoking ($p<0.05$).¹²⁰

Treatment

Nicotine-replacement therapy (NRT) was found to assist patients to quit in combination with behavioural support.^{35,121} Varenicline was reported to help to relieve craving and withdrawal symptoms among psychiatric patients.¹²²

Quit Smoking Clinic

A total of 17.3% of smokers attending smoking cessation clinics were able to quit smoking for at least six months.¹²³ At 3-month follow up, 35.4% reported abstinence.

The majority of smokers attending health clinics in Sepang, Malaysia were found to be in the 20-29 age group and were mostly males ($p<0.05$).⁴⁵ A total of 31.6% of attendees at a health clinic in Cheras were smokers at some point in time.¹²⁴ Three quarter of attendees at health clinics intended to stop smoking.⁴⁵ There was no significant difference noted in changes of motivation stage between relapsers and non-quitters. The same study also concluded that healthcare providers' recruitment strategies for cessation programmes should encompass smokers at all motivation stages.⁶⁵

The majority of dentists (98.8%) agreed that they had a potential role in smoking cessation counselling, but only few of them (17.9%) were actually involved in providing the intervention. The main barriers cited were lack of training and time in their practice.¹²⁵

A study had reported that smokers were conflicted in their beliefs and feeling about smoking and quitting.¹²⁶ Smokers who displayed greater conflict with regards to quitting were more likely to choose gradual cessation.¹²⁷ Motivation to stop

smoking was found to predict cessation at 3-month follow-up.¹²⁸

Older age and longer duration of previous attempts have been shown to be predictors of successful quitting in the clinic population. Higher carbon monoxide reading at baseline predicted success at 6 months. Success rates varied greatly between clinics.¹²⁹

In a study which aimed to evaluate the psychometric properties of the Malay translated version of the brief questionnaire of smoking urges (QSU-Brief), the measure found to be a suitable measure of urges to smoke.¹³⁰

Predictors of Quit Attempts/ Abstinence

Smoking fewer cigarettes perday, higher levels of self-efficacy and more im-mediate quit intentions were predictive of both making a quit attempt and remaining abstinent. Previous shorter quit attempts and higher health concerns about smoking were only predictive of making an attempt, whereas prior abstinence for 6 months or more and older age were associated with maintenance.^{43,123}

Smokers aged 40 years and above were 6.7 times more successful in quitting, while those with high levels of confidence were nine times more likely to be successful. Self-referred smokers were ten times more successful and those attending for at least 30 minutes counselling session were 12 times more successful. Those who smoked more than ten sticks per day were ten times less successful in quitting smoking.¹²³

A study which measured threshold levels of the expired-air carbon monoxide concentration reported reducing the threshold to verify claimed smoking abstinence from 10 ppm to 5 ppm made minimal difference to documented success rates. Predictors of success at quitting appeared to be unaffected by the threshold used.⁸²

Religion and Smoking

In a study from the International Tobacco Control Southeast Asia Survey (ITC-SEA) between Malaysia and Thailand found majority of Muslims and Buddhists from both countries believed religion discourages smoking and encouraged them to quit, but a minority cited religious reasons as a prime motivator to quit.¹³¹

Among Muslims in Malaysian, religion and not societal norms had an independent effect on quit attempts¹³² with religion often cited as a reason for not smoking.⁶ Religious belief and positive attitude towards health prevented non-smokers from smoking.⁴⁴

In a study among 240 Muslim men from 12 mosques in Kuala Langat, only 31.6% of smokers compared to non-smokers (87.7%) and ex-smokers (73.6%) accepted smoking as haram. They felt that it was easier to quit smoking during the fasting month of Ramadan.⁶⁹

Job Performance and Smoking

Studies showed there was no significant relationship between smoking and job performance²⁷ and psychosocial job

variables with smoking cessation.¹³³ A study showed that at three months (OR 5 8.96; 95% CI: 1.14–70.76) and six months (OR 5 8.9; 95% CI: 1.15–68.65), men with higher co-worker support demonstrated a higher likelihood of quitting and those in a 'passive job' also demonstrated higher likelihood of quitting compared to those working in the 'low strain' category at six months (OR 5 9.92; 95% CI: 1.20–82.68).¹³³

The Influence of the Tobacco Industry

Many ASEAN countries still do not have well organized tobacco control strategies.¹³⁴ In Malaysia, the tobacco industry has been known to target smoking among youths despite working with the government to promote healthy youth activities.¹³⁵ Even though the government was successful in implementing regulations such as health warnings and advertising bans, they were compromised and effectively blocked from further progress.¹³⁶ The campaign against second-hand smoking has geared tobacco companies to prepare for a major threat to their industry. These include conducting national/international symposiums, consultant 'road shows' and extensive lobbying and media activities.¹³⁷ An example of this was the flouting of the World Cup of football's no-tobacco ruling.¹³⁸

Examining the roles of the private sector in tobacco cessation programmes, it is clear that tobacco companies have manoeuvred to exploit smokers by teaming up with unwary organisations to carry out health promotions for youths.¹³⁹ The tobacco industry has repeatedly denied that they target youth through intensive marketing and advertising. However, the evidence shows that the industry has very successfully created a positive image of tobacco use among adolescents.³⁴

The tobacco industry must accept responsibility and compensate smokers who wish to quit. Undoubtedly private companies can gain from this affiliation. The issue which arises pertains to the means by which this promising partnership can be carried out in the most transparent manner, especially within the confines of such a highly regulated industry such as the pharmaceutical sector.¹³⁹

Total Bans of Smoking and Increased of Cigarette Tax

The main factors influencing agreement of outdoor smoking ban were marital status. Approximately 75.0% of respondents agreed to ban cigarette smoking in restaurants.⁴¹

Support for total bans in air-conditioned venues was high and similar in both Malaysia and Thailand who believed there was a total ban, but self-reported compliance with bans in such venues was significantly higher in Thailand than in Malaysia (95% vs 51%; $p < 0.001$). Reporting a ban in air-conditioned venues was associated with a greater support for a ban in such venues for both countries.¹⁴⁰

Approval of total bans were more common in female medical students than in male medical students (OR =0.39 (95% CI: 0.18 – 0.86)).¹¹⁴ Students were the least likely to approve of total bans on cigarettes and increases in the price of cigarettes and most likely to approve bans on the use of cigarettes in public places and sales to individuals less than 16 years old.¹¹⁴

In Malaysia, a 10.0% increase in price would result in a 3.8% reduction in cigarette consumption over the long-run if annual tobacco tax increases were made. This reduced consumption would translate to between 174 and 179 fewer tobacco related deaths per year among the adult population. At the same time, the government would collect additional RM 437 million (US\$116 million) in cigarette excise taxes, or almost 23.0% more compared to what it will otherwise collect.³⁴ Additional government revenues from proposed annual tax increase in Malaysia can be used to help smokers in their cessation efforts and to support tobacco farmers to switch to alternative crops.³⁴

Prevalence estimates of cigarette tax avoidance/evasion vary substantially between countries and across time. In Malaysia, some prevalence estimates suggests substantial cigarette tax avoidance/evasion. Important associations have been found for household income and education in the likelihood of engaging in tax avoidance/evasion. These associations however varied both in direction and magnitude across countries.¹⁴¹

Government Initiative on Tobacco Control Policy

The efficacy of current policies are influenced by these four main factors: (a) the development of tobacco control policies due to poor law enforcement, (b) the failure of retailers to comply with the law, (c) the social availability of cigarettes to teenagers, and (d) easy availability of cheap, smuggled cigarettes.⁵⁵

Governments are required to implement varied measures to prevent smoking uptake. Health promotions only reach a limited segment of people. Hence, this results in situations where smokers are not followed-up. Treatment for tobacco is expensive and compounding to this is the high smoking prevalence burden. Many smokers are not aware of the probability of disease due to smoking. A number of healthcare providers are also not familiar with quit smoking procedures and NRT.¹³⁹

The thoughts about the harm of smoking, fear arousal, and social norms against smoking mediated the relation between TAK NAK anti-smoking mass media campaign on impact and quit intentions. Effective campaigns should prompt smokers to engage in both cognitive and affective processes and encourage consideration of social norms about smoking in their society.¹⁴²

Newer Modalities of Intervention

Recent intervention modalities include Quitline, a web-based system services are carried out by the pharmacists from the National Poison Centre through telephone. It was opened to the public in conjunction with 'World No Tobacco Day' on 31st May 2005. A user must have internet connectivity. Within a period of 2 months, a total number of 58 smokers and 2 proxy callers contacted the Quit Line and from these 52 smokers were enrolled into the program.¹⁴³

Online training modules include the Certified Smoking Cessation Service Provider (CSCSP) programme, developed for practicing pharmacists to equip pharmacy students with knowledge necessary for smoking cessation counselling.¹⁴⁴

Smoking cessation intervention consisting of phone calls and counselling delivered during the first month of quit attempt revealed significantly higher abstinence rates compared to a standard care approach.¹¹⁷

Hospitals provide a good setting to implement smoking cessation intervention especially in smokers with acute and chronic medical illness.¹⁴⁵ Hospital stays also provide an opportunity for the health carer to initiate and abide by the government policy which does not allow smoking within hospitals.¹⁴⁵

Connecting TB-tobacco treatment strategies with an integrated approach may be significant among TB patients who are smokers.⁸⁵

The marketing strategies for anti-smoking campaigns in terms of the product, price, accessibility, promotions, social implications needs to be examined and weighted to ensure more effective and comprehensive programmes.¹¹⁰

Genetic

The determinants of smoking behaviour is multifactorial. Both genetic and environmental factors play a crucial role. Research has shown that the nicotinic acetylcholine receptors (nAChRs) influences nicotine addiction among smokers. The α -4 subunit of nicotinic acetylcholine receptor (CHRNA4) gene is associated with smoking behaviour in many populations. In a recent study in a Malaysian population, AA genotype frequency for CHRNA4 rs2236196 polymorphism in the smoker group was 80.6% while it was 77.0% in non-smokers. No mutation (GG genotype) was detected in both groups.¹⁴⁶

Recommendation

There is a need to implement more comprehensive smoke-free legislation nationally across Malaysia.¹⁴⁷ A national policy on tobacco control which enables an integrated, inter-ministerial approach is vital.¹³⁶

Preventing adolescents from becoming smokers is the key to reducing national prevalence rates in smoking.¹⁴⁷ Strategies should be undertaken to equip students with skills of dealing with stressful situations and instil healthy lifestyle ideals.¹⁵ Knowledge of smoking hazards should be included in the education programme to reduce initiation of smoking among adolescents.⁷ Continuous and more comprehensive anti-smoking policy measures are needed in order to further prevent the increasing prevalence of smoking among Malaysian men, particularly those who are younger, of Malay ethnicity,^{18,25} lower education, those residing in rural residential areas and with lower socio-economic status.¹⁸

Early intervention on smoking prevention and risk awareness is perhaps more effective if initiated before the age of 12 years.⁸ Smoking prevention programmes should begin early in primary schools.⁴² Existing anti-smoking programmes need to take into account the factors that promote smoking to reduce the prevalence of intention to initiate smoking and increase the intention to cease smoking among adolescents.¹³ Adolescents should be educated on effective coping strategies in managing stress and learning to be assertive.⁴² It is vital to

address the perceptions of social norms⁴⁶ via intervention programmes to correct the misperception of peer smoking.⁵² The majority of Malaysians agree that laws should be created for smokers who are children but admitted to not setting a good example to their children as they reported smoking openly in front of them.¹¹⁰

National efforts to prohibit smoking in private spaces such as homes and cars need to be enhanced. As knowledge is significantly associated with appropriate practice towards secondary smoking, more efforts should refocused to increase and disseminate knowledge of the harmful effects of second-hand smoking.⁷⁹ In view of the significant health risks posed to children by second-hand smoke, public health policies are needed to protect this vulnerable population. The aim of such policies is to ensure the right of every child to grow up in an environment free of tobacco smoke.⁷⁷

Intensification of health education and anti-smoking programmes and modification of external factors in early adolescence are recommended to prevent smoking initiation.²⁸ Measures such as the teaching of skills to resist social pressure to smoke, the establishment of peer support groups and involvement of parents in anti-smoking programs are recommended among lower secondary school students.¹⁶ Susceptibility measure is a reliable predictor (in adolescents) and can be used as a screening tool to identify adolescents who are at risk of initiating smoking.⁵¹

In view of these matters, Ministry of Health Malaysia is thus recommended to immediately design more national health enhancement programmes to highlight and promote the importance and benefits of living a healthy lifestyle. Ideally, multi-lingual media can be used as the channel to deliver these messages^{25,110} including on public transportation.¹¹⁰ Anti-smoking programmes with emphasis on educating and providing support for smoking cessation should be integrated in the health care policy for the elderly.²² Strategies aimed at correcting the belief that smoking can reduce weight should be included as one of the components in the prevention of smoking.¹² Quit smoking interventions should be emphasized and be carried out on a larger scale during the fasting months.⁶⁹ Smoking cessation strategies should be tailored according to the different smoking stages.⁴⁷

SECTION 2: RELEVANCE OF FINDINGS FOR CLINICAL PRACTICE

The following research reviewed carries relevance for programmes targeted at smoking cessation in the current population. Identification of risk and protective factors can help inform quit smoking strategies.

Epidemiological data derived from this review suggest the need for a targeted intervention programme in the community. The cornerstone of a 'smoke-free' society relies on the capacity to perform targeted screening on susceptible groups within the community. Both public health officials and primary care clinicians should collaborate in identifying specific segments of the population that require preventive measures.

As evidenced in this review, the criteria of screening interventions should include, among others, different age groups (adolescents/mean initiation age), gender groups (males), specific populations (adolescents, schoolchildren, working class) and selective regions in the country (FELDA settlements). Subsequently, primary care clinics can play an instrumental role in providing further care for these vulnerable groups through readily available programmes such as smoking cessation clinics.

Smoking clearly leads to serious health hazards in the society. Increased efforts in smoking cessation measures could help decrease the burden of various health problems in the country. Thus, health problems in patients should prompt clinicians to make a conscious effort to inquire about their smoking habits.

With the lack of local long term outcome studies, the role of e-cigarettes, vaping and shisha smoking remains an area of controversy. At present, as seen amongst shisha smokers, the general assumption in the society indicates the widespread belief that these alternatives to smoking are less harmful than cigarette smoking as it is devoid of tobacco. In the absence of concrete information on the safety of these smoking habits, it would be prudent to strictly regulate the consumption of vaping and shisha smoking. Healthcare providers should be tasked to educate the public and enable them to make an informed decision with regards to these newer smoking alternatives. This pre-emptive measure could help avoid the creation of a 'hidden reservoir' of health burden in the future.

SECTION 3: FUTURE RESEARCH DIRECTION

Numerous constraints impede the progress of research into smoking cessation in Malaysia, chiefly a lack of resources such as funding, manpower, and waning interest in an area that has received widespread attention at an international level.

Most studies in this area are saturated with prevalence studies targeting adolescents and factors associated with smoking initiation. The overemphasis on student initiated research into this area has resulted in research samples largely from school and institutional settings. Immediately lacking are studies examining smoking in adults and special groups. We need to develop more extensive collaborations between centers to overcome limited resources within a single centre when designing future studies in this area.

There is also the constraint of recruiting new samples at quit smoking clinics due to various reasons such as smokers themselves not seeking clinic help to quit smoking and healthcare workers not doing enough to encourage participation. Community intervention programmes are sorely needed for smokers who want to quit without clinic assistance.

At present there are few clinical trials, pharmacotherapy and behavioural support interventions available to improve cessation. There is a need for more clinical trial research. To date, there has been no research done examining the side

effects of varenicline or any other preventive methods in Malaysia. A safety profile of all drug based smoking cessation interventions would inform both users and prescribers.

Research into the relationship among environmental factors, behavioural, developmental, social and other factors in greater depth and in relation to interventional studies is required to determine new interventional strategies for quitting smoking.

There is a need for conclusive research into the use of e-cigarettes and vaping and its role in helping smokers quit smoking. There is currently no local data as to whether electronic cigarettes may be a gateway into conventional tobacco smoking for never smokers by increasing the initiation of smoking in adolescents and young adults. We do not know much if electronic cigarettes can assist recalcitrant smokers to quit in Malaysia. There is an urgent need of scientific evidence in using electronic cigarettes as a 'tobacco control strategy' without additional rigorous studies. The consequences of the recent move by the government to prohibit and confiscate vape juices containing nicotine should also be examined. Long term studies examining the health effects of vape usage should be undertaken, along with sourcing treatment to help vapers quit.

It would be interesting to determine the consequences of the recent 40.0% price hike for cigarettes, which may possibly result in higher use of contraband cigarettes, an increase in the number of e-cigarettes users, or a higher number of individuals quitting smoking altogether.

There is a need to review and enhance the existing mandatory health warning messages on cigarette packs in Malaysia and the implementation of plain packaging in Malaysia.

Lastly, to achieve Malaysia a tobacco free nation by 2045, research in areas to strengthen tobacco control enforcement and legislation, community empowerment through multi-sectorial collaborations and MPOWER strategies are setting the future direction of the research in this country.

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