Adherence to Pharmacological Smoking Cessation Interventions among Male Smokers in Abha; Saudi Arabia

Majed Ali Alahmari, MD* Yahia Mater Al-Khaldi, MD** Safar Abadi Alsaleem, MD*** Ibrahim Hassan Alasmari, MD** Ayidh Abduallah Alasmari, MD**** Bander Abdullah Almudawi, MD**** Ali Mohammed Alfalahi, MD*****

ABSTRACT

Study design: descriptive cross-sectional study.

Aim: To assess adherence to pharmacological smoking cessation interventions among male smokers in Abha Smoking Cessation clinic, kingdom of Saudi Arabia.

Methodology: A descriptive cross-sectional study was conducted at Abha Smoking Cessation clinic, Southern of Saudi Arabia. The study targeted all the clinic attendants during 2019 G Male smokers who had the first dose on smoking cessation medication were included. Data were collected from participants using electronic questionnaire developed by the researchers after intensive literature review. The questionnaire was sent to the patients electronically to fill and resend again. The data collected were smoker's demographic data, smoking data, prescribed medications, and adherence to medications.

Results: A total of 304 male smokers attending the clinic completed the survey questionnaire. Male participants ages ranged from 15-85 years old with mean age of 39.5 ± 12.8 years old. Exact of 50% of the participants were married and 54.3% had university level of education. Nearly 66% of the adherent smokers to the given medication were on Varenicline 1 mg and 65.3% of adherent smokers were on Varenicline 0.5 mg compared to 55.3% and 60.7% among non-adherent group P=.078. About 89% adherent participants succeeded to quit smoking compared to 25.7% of non-adherent group with reported statistical significance P=.001.

Conclusions: In conclusion, one out of each three smokers were adherent to the prescribed medication. Smoking duration, having a smoker friend, perceived drug benefit, and drug side effects were the main motivators behind non-adherence.

Keywords:Smoking cessation, Medication, Adherence, Determinants, Male, Quitter, Compliance, Drugs

INTRODUCTION

Smoking is a bad practice in which a substance is burned and the resulting smoke breathed in to be tasted and absorbed into the bloodstream. Mostly, the substance used is the dried leaves of the tobacco plant[1]. Smoking affects badly on health. Tobacco smoking related diseases have been shown to kill approximately half of long-term smokers when compared to average mortality rates faced by non-smokers[2]. Smoking caused over five million deaths a year from 1990 to 2015[3]. The prevalence of current smoking in Saudi Arabia ranges from 2.4-52.3%. Among school students, the prevalence of current smoking ranges from 12-29.8%, among university students from 2.4-37%, and among adults from 11.6-52.3%. In elderly people, the prevalence of current smoking is 25%[4]. The prevalence of smoking in males ranges from 13-38% median = 26.5%, while in females it ranges from 1-16%[5]. Smoking cessation, which is also named quitting smoking or stopping smoking, is the process of discontinuing tobacco smoking[6]. Tobacco smoke contains nicotine, which is addictive and can cause dependence[7,8]. Nicotine withdrawal often makes the process of quitting difficult[9]. The Anti-Smoking smoking cessation Clinics are settings to facilitate access to therapeutic services and integrate these clinics with other healthcare providers to ensure a standard high-quality service for all beneficiaries. These clinics can be an easy and significant way to treat tobacco use and dependence. It provides intensive treatments to smokers motivated to quit, ensuring a higher success rate, but also treats "difficult" patients[10].

There are some medications which can help smokers to quit smoking. The most recorded and used in USA and Europe includes nicotine replacement therapy NRT, bupropion and varenicline. Cytisine similar to varenicline is licensed for use in Russia and Eastern Europe. They are nearly the drugs used inanti-smoking clinics in Saudi Arabia[11-13]. Smoking cessation Medication adherence is a contest in clinical practice Vrijens et al.[14], define medication adherence as "the process by which patients take their medication as prescribed." Medication adherence passes into three quantifiable phases: initiation: when patients take their first dose of the medication, discontinuation: when patients stop taking their prescribed medication, and implementation: the extent to which patients' actual dosing corresponds to the prescribed regimen, from initiation until the last dose[15]. Adherence with the prescribed duration of treatment recorded among 50% or fewer NRT users[16,17]. The current survey aimed to assess adherence to pharmacological smoking

* Family Medicine Resident
Ministry of Health, Kingdom of Saudi Arabia
E-mail: majed_86_@hotmail.com
** Family Medicine Consultant
Ministry of Health, Kingdom of Saudi Arabia
*** Associate Professor
Department of Family & Community, Medicine, King Khalid University, Kingdom of Saudi Arabia
**** Medical Intern, King Khalid University, Kingdom of Saudi Arabia
***** General Practitioner, Ministry of Health, Kingdom of Saudi Arabia

cessation interventions and its predictors among male smokers in Abha Smoking Cessation clinic, kingdom of Saudi Arabia.

METHODOLOGY

This descriptive cross-sectional study was conducted at Abha Smoking Cessation clinic, Southern of Saudi Arabia. Abha is the capital of Aseer province, Southern of Saudi Arabia where nearly all smokers in the region attend Abha smoking cessation clinic. The study targeted all the clinic attendants during 2019 G Male smokers who had the first dose on smoking cessation medication were included.

Study Setting: The study was conducted in Abha Smoking Cessation clinic, Southern of Saudi Arabia.

Study Design: A descriptive cross-sectional approach was used.

Study Duration: The study was conducted at the selected setting during academic years 2020-2021.

Study Population: This study included all male smokers attending Abha Smoking Cessation clinic for smoking quit at 2019 G.

Inclusion Criteria:
- Male gender,
- Had the first dose on smoking cessation medication,

Exclusive Criteria:
- Not initiated the medication therapy.

Sample size and sampling technique
The sample size n and margin of error E are given by:

x = Zc/1002r100-r
n = N x/N-1E2 + x
E = Sqrt[N - nx/nN-1]

So the of total sample is 304 smokers out of 1080 smokers attending the smoking cessation clinic during the study period and fulfilling the inclusion criteria were included consecutively using systematic random sample by including each 5th attendant. Selected persons were included in the study after explaining the purpose of the study and confirming data confidentiality. After obtaining permission from Institutional ethics committee by REC-NO. REC-14-06-2020 on 16/06/2020, Data were collected from participants using electronic questionnaire developed by the researchers after intensive literature review. The questionnaire was sent to the patients electronically to fill and resend again. The questionnaire included smokers age, marital status, education, and medical diseases. Smoking data including type of smoking, duration, family history or college smoking were in the second part of the questionnaire. Smoking cessation medications and their side effects were covered in the third part. Smokers were asked about their adherence level and commitment with the prescribed medications and if stopped smoking and for which reason they returned among relapsers.

Data Analysis: After data collection, it was revised, coded, and fed to statistical software IBM SPSS version 22SPSS, Inc. Chicago, IL. All statistical analysis was done using two tailed tests. P value less than 0.05 was statistically significant. Descriptive analysis based on frequency and percent distribution was done for all variables including smoker's demographic data, smoking data, and adherence to medications. Crosstabluation was used to assess distribution of smoker's adherence for prescribed smoking cessation medications and smoker's personal data, smoking data, prescribed medications, and outcome of adherence. Relations significance were tested using Pearson chi-square test.

RESULTS

Here comes the most crucial step for your research publication. Ensure the drafted journal is critically reviewed by your peers or any subject matter experts. Always try to get maximum review comments even if you are well confident about your paper.

Table 1: Distribution of adherence rate for prescribed medications according to smoker's personal characteristics

Personal data		Total		Adherence to given medication				P-value
				Adherent		Not adherent		
		No	%	No	%	No	%	
Age	15-30	151	49.7%	48	49.0%	103	50.0%	.268
	31-60	127	41.8%	38	38.8%	89	43.2%	
	61-90	26	8.6%	12	12.2%	14	6.8%	
Marital status	Single	139	45.7%	45	45.9%	94	45.6%	.993
	Married	152	50.0%	49	50.0%	103	50.0%	
	Divorced/ widow	13	4.3%	4	4.1%	9	4.4%	
Educational level	Below secondary	29	9.5%	10	10.2%	19	9.2%	.861
	Secondary	110	36.2%	37	37.8%	73	35.4%	
	University/ above	165	54.3%	51	52.0%	114	55.3%	
Work	Employee	113	37.2%	34	34.7%	79	38.3%	.741
	Free works	23	7.6%	8	8.2%	15	7.3%	
	Not working	59	19.4%	17	17.3%	42	20.4%	
	Student	109	35.9%	39	39.8%	70	34.0%	
Monthly income	< 2000 SR	144	47.4%	46	46.9%	98	47.6%	.526
	2000-10000 SR	111	36.5%	33	33.7%	78	37.9%	
	> 10000 SR	49	16.1%	19	19.4%	30	14.6%	
Chronic diseases	None	177	58.2%	56	57.1%	121	58.7%	.339
	Asthma	31	10.2%	12	12.2%	19	9.2%	
	HTN	43	14.1%	17	17.3%	26	12.6%	
	DM	74	24.3%	24	24.5%	50	24.3%	
	CVD	20	6.6%	10	10.2%	10	4.9%	
	Depression	13	4.3%	2	2.0%	11	5.3%	

P: Pearson X^2 test
* P < 0.05 significant

A total of 304 male smokers attending the clinic completed the survey questionnaire. Male participants ages ranged from 15-85 years old with mean age of 39.5 ± 12.8 years old. Exact of 50% of the participants were married and 54.3% had university level of education. Regarding work, 37.2% of the participants were employees and 35.9% were students. As for chronic diseases, 24.3% were diabetic, 14.1% were hypertensive, and 10.2% were asthmatic. Exact of 47.4% of the participants had monthly income less than 2000 SR. All these factors were insignificantly different among antismoking medications adherent and non-adherent groups P>0.05 for all (Table 1).

A total number of 98 32.2% participants reported for being completely adherent to the given smoking cessation medications during their attempt to quit smoking. Exact of 23.4% of non-adherent group were totally noncompliant while 44.4% were partially compliant to the given medications.

(Table 2) shows distribution of adherence rate for medications by male participants smoking data. Exact of 66.3% of smokers who were adherent for treatment smoked cigarettes compared t75.2% of non-adherent group and overall cigarette use of 72.4%. Also, 33.7% of adherent patients for the treatment used Smokeless tobacco in comparison to 35.9% of non-adherent respondents with overall use of 35.2% with no statically significance P=.434. Exact of adherent smokers for the treatment smoked for 1-10 years followed by 30.6% for less than 1 year compared to 57.8% and 12.1% of non-adherent group, respectively with reported statically significance P=.001. Also, 67.3% of adherent smokers had a friend as a smoker or tobacco user compared to 78.6% of non-adherent respondents P=.034. The most reported reason for attempts to quit smoking or any form of tobacco among adherent group was medical advice 53.1% followed by personal decision 38.8% while the most reported for non-adherent group was medical advice 49.5% followed by family advice 41.7% P=.001.

With regard to type and effect of given medication and its relation with smokers adherence (Table 3), 66.3% of the adherent smokers to the given medication were on Varenicline 1 mg and 65.3% of adherent smokers were on Varenicline 0.5 mg compared to 55.3% and 60.7% among non-adherent group P=.078. As for the extent of adherence to the dose of the given drug, 64.3% of the adherent group reported usual commitment compared to 16% of non-adherent participants P=.001. Exact of 54.1% of adherent participants reported that medications were very useful to them in comparison to 10.2% of non-adherent smokers P=.001. Regarding medications side effects, the most reported among adherent respondents were headache 40.8% followed by nausea with difficult sleeping 20.4% for each. On the other hand, the most reported side effects among non-adherent participants were headache 61.2% followed by difficult sleep 37.9% and nausea 23.8% with recorded statistical significance P=.001. Exact of 41.8% of adherent respondents used medications for the drugs side effects in comparison to 85% of non-adherent group P=.001.

(Table 4) illustrated outcome of adherence to smoking cessation medications among study participants. Exact of 88.8% adherent participants succeeded to quit smoking compared to 25.7% of non-adherent group with reported statistical significance P=.001. Also, 85.7% of quitters among adherent respondents did not return to smoking after quitting compared to 21.8% of non-adherent respondents P=.001. As for reasons of return to smoking, the most reported among adherent participants were weak willpower 64.3% followed by sitting with smokers and their influence on them 50%. Among non-adherent respondents, the most reported were irregular use of medication 52.2% followed by weak willpower 49.7%, and medications side effects 38.5%. These differences showed a statically significance P=.001.

DISCUSSION

The current study was conducted to assess adherence rate to pharmacological smoking cessation interventions among male smokers in Abha Smoking Cessation clinic, to detect most related non adherent intervention, and to detect predictors of non-adherence to

Table 2: Distribution of adherence rate for prescribed medications according to smoking characteristics

Smoking data		Total		Adherence to given medication				P-value
				Adherent		Not adherent		
		No	%	No	%	No	%	
Smoking type	Cigarettes	220	72.4%	65	66.3%	155	75.2%	.434
	Shisha	85	28.0%	24	24.5%	61	29.6%	
	Timpak	49	16.1%	17	17.3%	32	15.5%	
	Shammah	107	35.2%	33	33.7%	74	35.9%	
	E-cigarette	33	10.9%	12	12.2%	21	10.2%	
	Cigar	12	3.9%	6	6.1%	6	2.9%	
Duration of smoking	< 1 year	55	18.1%	30	30.6%	25	12.1%	.001*
	1-10 Yrs.	163	53.6%	44	44.9%	119	57.8%	
	> 10 years	86	28.3%	24	24.5%	62	30.1%	
Anyone in your family who smokes or uses tobacco	Yes	82	27.0%	27	27.6%	55	26.7%	.876
	No	222	73.0%	71	72.4%	151	73.3%	
Have a friend as a smoker or tobacco user?	Yes	228	75.0%	66	67.3%	162	78.6%	.034*
	No	76	25.0%	32	32.7%	44	21.4%	
Had previous attempts to quit smoking or any form of tobacco	Yes	127	41.8%	44	44.9%	83	40.3%	.447
	No	177	58.2%	54	55.1%	123	59.7%	
The reason for your quitting smoking or using any kind of tobacco	Personal decision	76	25.0%	38	38.8%	38	18.4%	.001*
	Medical advice	154	50.7%	52	53.1%	102	49.5%	
	Family advice	117	38.5%	31	31.6%	86	41.7%	
	Friend advice	77	25.3%	16	16.3%	61	29.6%	

P: Pearson X^2 test
* P < 0.05 significant

Table 3: Distribution of adherence rate for medications according to prescribed medication and its side effects

Medications		Adherence to given medication						P-value
		Total		Adherent		Not adherent		
		No	%	No	%	No	%	
Medication used to help quit smoking or any type of tobacco	Varenicline 0.5 mg	189	62.2%	64	65.3%	125	60.7%	0.078
	Varenicline 1 mg	179	58.9%	65	66.3%	114	55.3%	
	Nicotine lozenges 2 mg	71	23.4%	27	27.6%	44	21.4%	
	Nicotine replacement therapy patches	99	32.6%	26	26.5%	73	35.4%	
	Bupropion 150 mg	32	10.5%	14	14.3%	18	8.7%	
The extent of your commitment to the doses of medicines	Not adherent	77	25.3%	0	0.0%	77	37.4%	.001*
	Sometimes	131	43.1%	35	35.7%	96	46.6%	
	Usually	96	31.6%	63	64.3%	33	16.0%	
The extent of benefit from the medication	Not useful	14	4.6%	0	0.0%	14	6.8%	.001*
	To some extent	101	33.2%	33	33.7%	68	33.0%	
	Moderately useful	115	37.8%	12	12.2%	103	50.0%	
	Very useful	74	24.3%	53	54.1%	21	10.2%	
Drugs side effects	None	63	20.7%	29	29.6%	34	16.5%	.001*
	Headache	166	54.6%	40	40.8%	126	61.2%	
	Nausea	69	22.7%	20	20.4%	49	23.8%	
	Difficult sleep	98	32.2%	20	20.4%	78	37.9%	
	Taste changes	37	12.2%	9	9.2%	28	13.6%	
	Skin irritation	38	12.5%	6	6.1%	32	15.5%	
	Mouth dryness	11	3.6%	4	4.1%	7	3.4%	
	Mood changes	27	8.9%	10	10.2%	17	8.3%	
	Depression	2	.7%	1	1.0%	1	.5%	
	Appetite changes	7	2.3%	2	2.0%	5	2.4%	
	Weight gain	17	5.6%	6	6.1%	11	5.3%	
	Frequent dreams	13	4.3%	4	4.1%	9	4.4%	
The side effects mentioned by the attending physician?	Yes	221	72.7%	72	73.5%	149	72.3%	.823
	No	16	5.3%	6	6.1%	10	4.9%	
	Don't remember	67	22.0%	20	20.4%	47	22.8%	
Side effects lead to leaving the medications?	Never	88	28.9%	57	58.2%	31	15.0%	.001*
	Sometimes	183	60.2%	41	41.8%	142	68.9%	
	Usually	33	10.9%	0	0.0%	33	16.0%	

P: Pearson X^2 test
* $P < 0.05$ significant

Table 4: Outcome of adherence to smoking cessation prescribed medications among study participants

Outcome		Total		Adherence to given medication				P-value
				Adherent		Not adherent		
		No	%	No	%	No	%	
Quit	Quitter	140	46.1%	87	88.8%	53	25.7%	.001*
	Relapse	164	53.9%	11	11.2%	153	74.3%	
Returned to smoking or using any kind of tobacco products after quitting and using medication?	No	129	42.4%	84	85.7%	45	21.8%	.001*
	Once	11	3.6%	3	3.1%	8	3.9%	
	Many times	164	53.9%	11	11.2%	153	74.3%	
Reason for returning to smoking or using tobacco again	Weak willpower	89	50.9%	9	64.3%	80	49.7%	.001*
	Sitting with smokers and their influence on me	67	38.3%	7	50.0%	60	37.3%	
	Medication side effects	64	36.6%	2	14.3%	62	38.5%	
	No benefit of medication	21	12.0%	1	7.1%	20	12.4%	
	Inability to re-dispense medications	25	14.3%	2	14.3%	23	14.3%	
	Unavailability of medicines	5	2.9%	2	14.3%	3	1.9%	
	Irregular use of medications	84	48.0%	0	0.0%	84	52.2%	

P: Pearson X^2 test
* $P < 0.05$ significant

pharmacological smoking cessation interventions. The study revealed that majority of the participants were young, married, highly educated, and nearly half of them had chronic health problem. The findings which attracted attention were that nearly one third of the attendants for the clinic were students and nearly half of them had low income less than 2000 SR monthly. This may explain their concern to stop smoking due to high cost for the students and low-income males.

Regarding participants adherence for the given medications, about one third of the participants were totally adherent to the prescribed medications by their physicians 32.2%. Nearly 23% of non-adherent group were totally noncompliant while 44% were partially compliant to the given medications. This was higher than reported by Lam TH et al, 2005 in china[18], who found that the prevalence of adherence among Chinese smokers in Hong Kong was 16%. The 7-day point prevalence quit rate at 12 months was 27%. A higher level of adherence was reported by Karadoğan D et al,[19] where Bupropion was medication in 52% of the smokers, which was 35.8% for varenicline and 12.1% for a combination of the nicotine patch and gum. Researchers reported that 59% of the smokers were non-adherent to their treatment and 51.7% had only one control visit number. Generally, studies reported that 20% of smokers who had smoking cessation medication prescriptions never meet that prescription[20,21]. Also, it was reported that smokers who had medications for tobacco dependence mostly use at a lower dose and for shorter duration than recommended[22-25]. Literature indicated that the adherence for recommended duration of treatment reported among nearly half or even fewer of NRT users[26-28].

Regarding factors associated with smoker's adherence for prescribed medications, the current study revealed that none of the smoker's personal characteristic were significantly associated with adherence rate. In total, adherence for prescribed medications was insignificantly higher among young aged male smokers, married smokers, students, and those with low income. Lack of adherence was significantly higher among smokers for long duration than among recent smokers less than 1 year. Also, having a smoker friend was significantly associated with lack of adherence for the prescribed medication and that item played a vital role in failing to quit smoking as "sitting with smokers and their influence on me" was one of the most reported reasons by all participants for returning to smoking or using tobacco again. One interesting finding was that the main reasons for attending antismoking clinic that mentioned by non-adherent smokers were family advice after medical advice but very low portion of them reported for being personal decision 18% compared to 38% among adherent group. This explains that personal motive has a vital role in keeping smoker's adherence for medication prescription for quitting smoking. Others advice may play a role in taking the decision of smoking quitting but not assure commitment and completion.

Regarding the relation between prescribed medications and smoker's adherence, the current study showed that Varenicline was the most prescribed drug with nicotine replacement therapy patches. Type of medication was insignificantly associated with adherence but adherence to the dose of drug was the main factor. This was concordant with what reported by Karadogan D et al[19] who found that Varenicline users' quit rate was not statistically significantly different from the other treatment choices. But it was different of what reported by Balmford J et al[27,28] where adherence to NRT was recorded to be higher compared to other prescribed drugs. However, when offered over the counter, NRT had lower effectiveness compared to varenicline and bupropion due to poor adherence and early discontinuation.

The Second factor was the perceived benefit of the drug where all smokers who were completely adherent to the prescribed medication perceived some to high benefit while only one out of each ten non-adherent smokers perceived high benefit for the medications. Side effects were among the most significant predictors for discontinuation or non-adherence to the prescribed drugs. Nearly doubled portion of non-adherent smokers had side effects compared to adherent smokers. The most reported side effects were headache, and difficult sleeping. These side effect forced 85% of non-adherent group to leave the medication in comparison to less than half of the adherent smokers. These findings were similar to Balmford J et al,[29] who found that nearly 18% of the smokers receiving smoking cessation medications had side effects and 17% believed that the medication was no longer needed. Among smokers who completed treatment, 37.9% reached 6-month continuous abstinence contrasted with 15.6% who discontinued prematurely. Particularly, 65.6% who discontinued because they believed the medication had worked were abstinent.

The current study revealed that more than three quarters of adherent smokers became quitters compared to only one quarter of non-adherent group with overall quit rate of 46.1%. Also, relapse rate was significantly higher among non-adherent who stopped smoking than adherent group 78.2% vs. 14.3% where the main reasons were weak willpower, sitting with smokers, and medication side effects. Overall quit rate was 27.9%, with higher quit rates among varenicline users. Other international studies assessed quit rate range from 25% to 53%[30-32].

CONCLUSION and RECOMMENDATIONS

In conclusion, one out of each three smokers were adherent to the prescribed medication. Smoking duration, having a smoker friend, perceived drug benefit, and drug side effects were the main motivators behind non-adherence. Also, treatment adherence is the main factor in quit success. Understanding factors that impact medication non-adherence is crucial to improve adherence and improve smoking cessation outcomes. Continuous close supervision and support of smokers intending stop smoking is required with explaining the prescribed drugs side effects will make the decision to be from his own and this is the cornerstone for drug adherence.

1. Creating a counseling center or psychiatric clinic at the nursing faculty to detect students with psychological issues early on.
2. There should be lectures on how to boost self-confidence and overcome shyness, which prevents people from participating, interacting, and forming relationships and friendships.
3. 3. Teachers should communicate with and be connected to their pupils. Also, plan classes and talks to teach students how to improve their social communication skills, conquer their fear of loneliness, and communicate with their colleagues.
4. More research on the impact of loneliness symptoms on academic success should be conducted.

Authorship Contribution: All authors share equal effort contribution towards (1) substantial contributions to conception and design, acquisition, analysis and interpretation of data; (2) drafting the article and revising it critically for important intellectual content; and (3) final approval of the manuscript version to be published. Yes.

Potential Conflict of Interest: None.

Competing Interest: None.

Acceptance Date: 06 January 2022

REFERENCES

1. Bergström J. Tobacco smoking and risk for periodontal disease. J Clin Perdontol 2003;30(2):107-13.
2. Zaher C, Halbert R, Dubois R, et al. Smoking-related diseases: the importance of COPD. Int J Tub Lung Dis 2004;81(2):1423-8.
3. Reitsma MB, Fullman N, Ng M, et al. Smoking prevalence and attributable disease burden in 195 countries and territories, 1990-2015: A systematic analysis from the Global Burden of Disease Study 2015. The Lancet 2017;389(10082):1885-906.
4. Tahir MZ. Smoking and its risks in Saudi Arabia: Literature review. Ham Med J 2019;12(4):152-7.
5. Alasqah I, Mahmud I, East L, et al. A systematic review of the prevalence and risk factors of smoking among Saudi adolescents. Saud Med J 2019;40(9):867-79.
6. Mooney ME, Johnson EO, Breslau N, et al . Cigarette smoking reduction and changes in nicotine dependence. Nicotine Tob Res 2011;13(6):426-30.
7. Russell MA, Feyerabend C. Cigarette smoking: a dependence on high nicotine boli. Drug Metab Rev 1978;8(1):29-57.
8. Parnes B, Main DS, Holcomb S, et al. Tobacco cessation counseling among underserved patients: a report from CaReNet. J Fam Pract 2002;51(1);65-9.
9. Kenny PJ, Markou A. Neurobiology of the nicotine withdrawal syndrome. Pharmacol Biochem Behav 2001;70(4):531-49.
10. Kennedy DT, Giles JT, Chang ZG, et al. Results of a smoking cessation clinic in community pharmacy practice. J Am Pharm Assoc 2002;42(1):51-6.
11. Shiffman S, Brockwell SE, Pillitteri JL, et al. Use of smoking-cessation treatments in the United States. Am J Prev Med 2008;34(2):102-11.
12. Centers for Disease Control and Prevention CDC. Quitting smoking among adults--United States, 2001-2010. MMWR. Morbidity and mortality weekly report 2011;604(4):1513.
13. Steinberg MB, Akincigil A, Delnevo CD, et al. Gender and age disparities for smoking-cessation treatment. Am J Prev Med 2006;30(5):405-12.
14. Vrijens B, De Geest S, Hughes DA, et al. A new taxonomy for describing and defining adherence to medications. Br J Clin Pharmacol 2012;73(5):691-705.
15. Raupach T, Brown J, Herbec A, et al. A systematic review of studies assessing the association between adherence to smoking cessation medication and treatment success. Addiction 2014;109(1):35-43.
16. Burns EK, Levinson AH. Discontinuation of nicotine replacement therapy among smoking-cessation attempters. Am J Prev Med 2008;34(3):212-5.
17. Catz SL, Jack LM, McClure JB, et al. Adherence to varenicline in the Compass smoking cessation intervention trial. Nicotine Tob Res 2011;13(5):361-8.
18. Lam TH, Abdullah AS, Chan SS, et al. Adherence to nicotine replacement therapy versus quitting smoking among Chinese smokers: a preliminary investigation. Psychopharmacol 2005;177(4):400-8.
19. Karadogan D, Onal O, Şahin DS, et al. Treatment adherence and short-term outcomes of smoking cessation outpatient clinic patients. Tob Induct Dis 2018;16:38.
20. Solberg LI, Parker ED, Foldes SS, et al. Disparities in tobacco cessation medication orders and fills among special populations. Nicotine Tob Res 2010;12(2):144-51.
21. Zeng F, Chen CI, Mastey V, et al. Effects of copayment on initiation of smoking cessation pharmacotherapy: an analysis of varenicline reversed claims. Clin Ther 2011;33(2):225-34.
22. Hays JT, Leischow SJ, Lawrence D, et al. Adherence to treatment for tobacco dependence: association with smoking abstinence and predictors of adherence. Nicotine Tob Res 2010;12(6):574-81.
23. Shiffman S, Ferguson SG, Rohay J, et al. Perceived safety and efficacy of nicotine replacement therapies among US smokers and ex-smokers: relationship with use and compliance. Addiction 2008;103(8):1371-8.
24. Swan GE, McClure JB, Jack LM, et al. Behavioral counseling and varenicline treatment for smoking cessation. Am J Prev Med 2010;38(5):482-90.
25. Cheong YS, Ahn SH. Effect of Multi-modal Interventions for Smoking Cessation in a University Setting: A Short Course of Varenicline, Financial Incentives, E-mail and Short Message Service. Kor J Fam Med 2010;31(5):355-60.
26. Alterman AI, Gariti P, Cook TG, et al. Nicodermal patch adherence and its correlates. Drug Alcohol Depend 1999;53(2):159-65.
27. Cooper TV, DeBon MW, Stockton M, et al. Correlates of adherence with transdermal nicotine. Add Behav 2004;29(8):1565-78.
28. Balmford J, Borland R, Hammond D, et al. Adherence to and reasons for premature discontinuation from stop-smoking medications: data from the ITC Four-Country Survey. Nicotine Tob Res 2011;13(2):94-102.
29. Celik I, Yuce D, Hayran M, et al. Nationwide smoking cessation treatment support program-Turkey project. Health Policy 2015;119(1):50-6.
30. Onur ST, Uysal MA, Iliaz S, et al. Does Short Message Service Increase Adherence to Smoking Cessation Clinic Appointments and Quitting Smoking? Balkan Med J 2016;33(5):525-31.
31. Trofor AC, Man MA, Marginean C, et al. Smoking cessation for free: outcomes of a study of three Romanian clinics. Open Med 2016;11(1):605-10.
32. Gonzales D, Rennard SI, Nides M, et al. Varenicline Phase 3 Study Group. Varenicline, an α4β2 nicotinic acetylcholine receptor partial agonist, vs sustained-release bupropion and placebo for smoking cessation: a randomized controlled trial. JAMA 2006;296(1):47-55.