Original Research Article

Outcomes of Smoking Cessation in Post-Ischemic Heart Diseases

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Abstract

Background: Tobacco intake is related to an increased risk of stroke in subjects consuming it, and this increase is directly dependent on the dose of Tobacco being taken. Tobacco alone is documented to be the reason for approximately 12% to 15% of the stroke patients reported to medical care. **Aim:**The present study was aimed to evaluate the outcomes of smoking cessation after ischemic heart diseases. **Materials and Methods:** The study included 120 subjects who were followed for 1 year at the interval of 3 months, 6 months, and 12 months. Following parameters were assessed at all the recall intervals: Risk of outcomes for stroke, MI, and mortality depending on the smoking state, and reason for mortality in deceased. All the collected were subjected to statistical evaluation (95% Confidence Interval). **Results:** After the ischemic disease episode, out of the included 120 subjects 40% (n=48) quitted smoking whereas 60% (n=72) continued smoking after ischemic heart disease. It was seen that for MI there was significantly more risk in continued smokers at all the time intervals with the p-value of < 0.0001. Concerning stroke similar results were seen0.0002, 0.0116, 0.0023, and < 0.0001 respectively at consecutive recalls. Regarding death, significantly lesser deaths were seen in the quitters.In deceased subjects, it was seen that the highest number of death was reported by cardiovascular diseases in continued smokers. **Conclusion:**The present study concludes that smoking cessation has positive outcomes in subjects after ischemic heart diseases in terms of reduced risk of developing future diseases like MI and stroke significantly. Also, smoking cessation, lead to a reduction in the rate of mortality in a 12 month follow up in the present study

Keywords: Death, Ischemic heart diseases, Myocardial Infarction, Stroke, Smoking, Smoking cessation.

Introduction

Cardiovascular diseases are emerging as one of the major causes of death worldwide, ranking as the second-largest cause of death.[1] one of the common and emerging etiological causes of cardiovascular disease is tobacco consumption.[2] Tobacco intake is related to an increased risk of stroke in subjects consuming it, and this increase is directly dependent on the dose of Tobacco being taken.[3]

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Tobacco alone is documented to be the reason for approximately 12% to 15% of the stroke patients reported to medical care.[4] Tobacco is largely consumed in the smoke from, and hence smoking is one of the major etiological factors for stroke. Also, smoking can be stopped making it a preventable factor in stroke patients.[5] Apart from stroke, smoking is associated with various other health hazards including lung carcinomas, chronic obstructive pulmonary disease, peripheral artery diseases, and carcinomas of the urinary bladder.[6] Despite the documented role of smoking in various life-threatening diseases, it still is prevalent in approximately 21&% adults.[7] American

Heart Association (AHA) advocates refraining from smoking in primary prevention guidelines for stroke.[8] Although AHA reports never smoking as the best primary stroke prevention measure, smoking cessation is also a recognized strategy to reduce the risk of MI, stroke, and other smoking-related diseases. Smoking cessation over the long term can almost reduce the ischemic heart disease risk near to non-smoker.[9] Subjects with a previous history of ischemic cardiovascular diseases are at further higher risk of developing ischemic diseases in the future. For such subjects, smoking cessation can have a great positive impact. However, data documenting this cessation impact is scarce in the literature. Regarding AHA guidelines for smoking cessation, very limited data on a small population is available.[10] AHA guideline suggesting smoking cessation after the first transient ischemic attack is based on the results of research showing complete smoking cessation after the first stroke leads to diminished risk of developing future ischemic heart disease.[11] In literature, data is available depicting advantages and positive outcomes of smoking cessation in subjects with a history of Myocardial Infarction or Coronary artery disease. In a study, it was shown that the risk of recurrence for Coronary artery Disease is reduced near to never smoker in subjects with past ischemic heart disease in3 years, whereas, mortality risk after 10 years was reduced by 46%.[12] Another study reports a mortality rate reduction by 36% in 7 years.[13] Smoking cessation can be a powerful strategy in reducing the risk for recurrent cardiovascular diseases and mortality, and it could be one of the most significant approaches towards secondary prevention of ischemic heart diseases. Among the first-ever stroke, cases reported to the medical care, current smokers contribute a large population of approximately one-third of subjects with a percentage of 32-39%. Post-stroke only less than half of the subjects can quit their smoking habit.[14] Those who can quit their habit, many of them resume their smoking habit after a short period. In a study, after a 6-month evaluation, it was shown that among the subjects who quitted their smoking post-stroke only 28% did not resume smoking.[15] Smoking cessation is a very important secondary prevention target for subjects with the risk of developing ischemic heart disease, hence, positive outcomes of smoking cessation in stroke subjects should be reinforced to the subjects seeking health care.[16] Also, the focus of the concerned health-carephysician should be towards implementing the importance of smoking cessation in patients with a history of ischemic heart diseases as a measure of secondary prevention.[17] The present study was aimed to evaluate the outcomes of smoking cessation after ischemic heart diseases.

Materials and Methods

The present clinical trial was carried out to evaluate the outcomes of smoking cessation after ischemic heart diseases and whether smoking cessation is associated with a reduction in the risk of developing ischemic heart diseases including MI and stroke when compared to the subjects with continuous smoking. The subjects included in the present study were smokers at the time of the first episode of transient ischemic attack or stroke. The study included 120 subjects more than 40 years of age with the age range of 41-73 years, subjects who have a history of transient ischemic attack or stroke within the past 6 months, and subjects with no other associated systemic disease including diabetes.

Stroke was defined as either a new brain infarct or focal neurologic deficit present for 24 hours or more. A transient ischemic attack was defined by brain ischemia secondary to neurologic change lasting for 10 minutes or more but less than 24 hours. Also, subjects with neurological signs of dizziness, headache, and confusion persisting for 24 hours or more were included. All the included subjects were made to sign informed consent to be included in the study. The study was approved by the Ethical Committee of the institute.

The following subjects were excluded from the study: subjects with systemic diseases such as diabetes, pregnant/lactating females, liver diseases, stroke secondary to causes such as trauma/medical conditions, bladder cancer, and subjects on drugs such as oral contraceptives/steroids.

After subjects were included in the study, smoking status was recorded in detailfollowed by physical examination and blood test including glucose estimation to rule out diabetes. Smoking status was divided into four categories including 1) never smokers, 2) former smokers, 3) quitted smokers, and 4) present/continued smokers.

The subjects were randomized using the coin to avoid any bias.The subjects were followed for 1 year at the interval of 3 months, 6 months, and 12 months.Following parameters were assessed at all the recall intervals: Risk of outcomes for stroke, MI, and mortality depending on the smoking state, and reason for mortality in deceased subjects including cancers of colon, lung, brain, breast, prostate, etc., cardiovascular diseases, cerebrovascular diseases, trauma, or respiratory diseases. The present trial was an observational study. All the collected were subjected to statistical evaluation (95% Confidence Interval).

Results

The present clinical trial was carried out to evaluate the outcomes of smoking cessation after ischemic heart diseases and whether smoking cessation is associated with a reduction in the risk of developing ischemic heart diseases including MI and stroke when compared to the subjects with continuous smoking.

The subjects included in the present study were smokers at the time of the first episode of transient ischemic attack or stroke. After the ischemic disease episode, out of the included 120 subjects, 40% (n=48) quitted smoking whereas 60% (n=72) continued smoking after ischemic heart disease. The study included 120 subjects more than 40 years of age with the age range of 41-73 years. Other demographic characteristics of the study subjects are summarised in Table 1. Systemic disease evaluation was done where hypertension was reported by 56.25% (n=27) quitters and 44.44% (n=32) continued smokers, stroke by 33.3% (n=16) quitters and 29.16% continued smokers, and cancer in 14 quitters and 16.6% (n=1) continued smokers. Also, among quitted smokers 21 subjects smoked 21 cigarettes, 17 subjects 10-19 cigarettes/day, and 10 subjects smoked more than 20 cigarettes/day, whereas, in continued smokers 36, 22, and 14 subjects respectively per day smoked less than 10, 10-19, and more than 20 cigarettes per day.

The subjects were followed for 1 year at the interval of 3 months, 6 months, and 12 months. Risk of outcomes for stroke, MI, and mortality depending on the smoking state, and reason for mortality in deceased subjects including cancers of colon, lung, brain, breast, prostate, etc., cardiovascular diseases, cerebrovascular diseases, trauma, or respiratory diseases were assessed at all recall intervals.

The present study also assessed the risk of outcomes for stroke, MI, and mortality depending on the smoking state of the study subjects. The results are depicted in Table 2. It was seen that for MI (Myocardial Infarction), with regard to continued smokers (n=72), at baseline 33.3% subjects had MI (n=24), at 3 months, 6 months, and 12 months respectively 33.3% (n=24), 34.72% (n=25), and 37.5% (n=27) subjects had MI. These values were significant at all the time intervals with the p-value of < 0.0001. For quitted smokers the values for MI at baseline, 3 months, 6 months, and 12 months were 39.58% (n=19), 41.66% (n=20), 45.83% (n=22), and 47.91% (n=23) with p-vale of < 0.0001. Concerning stroke, in continued smokers the stroke was reported in 10, 11, 13, and 17 subjects, whereas, in quitters the values 16.6% (n=8), 18.75% (n=9), 22.91% (n=11), and 22.91% (n=11) respectively at baseline, 3 months, 6 months, and 12 months.The p-values showed the statistically significant differences with the values of 0.0002, 0.0116, 0.0023, and < 0.0001 respectively at consecutive recalls. Regarding death, significantly lesser deaths were seen in the quitters with values of 10.41% (n=5), 14.58% (n=7), 18.75% (n=9), and 22.91% (n=11) at baseline, 3 months, 6 months, and 12 months. For continued smokers these values were 16.6% (n=12), 18.05% (n=13), 19.44% (n=14), and 22.22% (n=16) respectively at consecutive recalls. These values were also statistically significant at all the recall intervals with p-value of< 0.0001.

In the deceased subjects, the cause of death was also evaluated. Among continued smokers at a total of 16 deaths were reported at the end of 12 months, whereas, this value was 11 for the quitters. This was a statistically significant difference with a p-value of < 0.0001. Causes of mortality in deceased subjects including cancers of colon, lung, brain, breast, prostate, etc., cardiovascular diseases, cerebrovascular diseases, trauma, or respiratory diseases were also evaluated and the results are depicted in Table 3. It was seen that the highest number of death was reported by cardiovascular diseases in continued smokers. In continued smokers, out of total deaths (n=16), 25% (n=4) deaths at the end of 12 months were reported, whereas, in quitted smokers, 9.09% (n=1) deaths were reported by cardiovascular diseases.

Table 1: Demographic Characteristics of study subjects

S. No	Demographic Characteristics	Smoking status	
		Quitted smokers (n=48)	Continued smokers (n=72)
1.	**Age (Mean±S.D)**	56.72±4.26	58.21±5.11
2.	**Gender**		
a	Male	26	38
b	Female	22	34
3.	**Disease History**		
a	Hypertension	27	32
b	Stroke	16	21
c	Cancer	14	12

d	Arterial Defibrillation	22	19
4.	**Examination**		
a	B.P (systolic/diastolic)	132±8.6	134±7.6
b	Blood Glucose (mg/dl)	98±6.4	94±5.7
5.	**Smoking History**		
a	Less than 10	21	36
b	10-19 cigarettes/day	17	22
c	More than 20 cigarettes/day	10	14
d	Duration of smoking (in years)	34±4.68	36±6.24

Table 2: Outcomes based on smoking status of study subjects

S.No	Outcomes-based on the Smoking Status	Time Interval			
		Baseline	**3 months**	**6 months**	**12 months**
1	**MI**				
A	Continued Smokers (n=72)	24 (33.3%)	24 (33.3%)	25 (34.72%)	27 (37.5%)
B	Quitted Smokers (n=48)	19 (39.58%)	20 (41.66%)	22 (45.83%)	23 (47.91%)
	p-value	< 0.0001	< 0.0001	< 0.0001	< 0.0001
2	**Stroke**				
A	Continued Smokers	10 (13.88%)	11 (15.27%)	13 (18.05%)	17 (23.61%)
B	Quitted Smokers	8 (16.6%)	9 (18.75%)	11 (22.91%)	11 (22.91%)
	p-value	0.0002	0.0116	0.0023	< 0.0001
3	**Death**				
A	Continued Smokers	12 (16.6%)	13 (18.05%)	14 (19.44%)	16 (22.22%)
B	Quitted Smokers	5 (10.41%)	7 (14.58%)	9 (18.75%)	11 (22.91%)
	p-value	< 0.0001	< 0.0001	< 0.0001	< 0.0001

Table 3: Causes of death at 12 months based on the smoking status of study subjects

S. No	Cause of death	Smoking Status	
		Continued Smokers (n=16)	**Quitted Smokers (n-=11)**
1.	**Carcinomas**		
a)	Colon	1	1
b)	Lung	-	1
c)	Brain	2	1
d)	Prostate	1	1
e)	Breast	2	1
f)	Bladder	1	1
2.	**Cerebrovascular Disease**	2	2
3.	**Trauma**	1	-
4.	**Cardiovascular diseases**	4	1
5.	**Respiratory Diseases**	1	1

6.	**Flu**	-	1
7.	**Liver Diseases**	-	-
8.	**Unknown Causes**	1	-

Discussion

The present clinical trial was aimed to evaluate the outcomes of smoking cessation after ischemic heart diseases and whether smoking cessation is associated with a reduction in the risk of developing ischemic heart diseases including MI and stroke when compared to the subjects with continuous smoking. The results depicted that smoking cessation in 6 months following ischemic heart diseases leads to the drastic reduction in future risk of developing stroke, transient ischemic diseases, MI, and/or death.

The present study focused on smoking cessation post-ischemic heart diseases and is in agreement with AHA guidelines on smoking cessation after ischemic heart diseases. The study focus on the fact that smoking cessation following ischemic heart diseases can be a most important strategy to reduce future risk of diseases and both treating health care physicians and the patient should focus on smoking cessation at the earliest following ischemic heart diseases.

Another study by Alvarez LR et al in 2013, evaluated smoking cessation effects on subjects after cerebrovascular diseases on 135 subjects who continued smoking and 105 smoking quitters and reported a reduction (non-significant) in mortality of quitters after 14 months. The present study was not per mentioned study as the difference in mortality was significant between smokers and non-smokers at baseline, 3 months, 6 months, and 12 months with the p-value of< 0.0001 at all the time-intervals[18].

The present study showed smoking cessation has early positive impacts on preventing mortality and future risk for developing ischemic heart diseases. These findings were consistent with the study by Ambrose JA et al in 2004 where authors reported short-term immediate positive effects of smoking cessation on stroke and Transient Ischemic Attack (TIA) within 5 years of cessation[19].

The findings of the present study also showed that smoking cessation significantly reduced the risk for MI and stroke. For MI,the p-value was < 0.0001 at all the time intervals showing a significant reduction in risk for MI after smoking cessation. Concerning stroke, p-values were 0.0002, 0.0116, 0.0023, and < 0.0001 which were significant at all the recall periods.These findings were in agreement with the study by Kim J et al in 2012 where authors reported a significant reduction in future ischemic heart disease following smoking cessation. However, a study by Kim J et al showed that risk reduction went back to baseline after 5 years of cessation[20].

In the deceased su]bjects, the cause of death was also evaluated. Among continued smokers at a total of 16 deaths were reported at the end of 12 months, whereas, this value was 11 for the quitters. This was a statistically significant difference with a p-value of < 0.0001. It was seen that the highest number of death was reported by cardiovascular diseases in continued smokers. In continued smokers, out of total deaths (n=16), 25% (n=4) deaths at the end of 12 months were reported, whereas, in quitted smokers, 9.09% (n=1) deaths were reported by cardiovascular diseases. The cancer finding was more in continued smokers (n=7) compared with the quitters (n=6). These findings were under the previous finding by Mohiuddin SM et al[21] in 2007 where less cancer was recorded in quitters compared to continued smokers[21]. Also, another study in agreement with the findings of the present study was a study by Jha P et al in 2013 where authors reported that death in current smokers was three times higher compared to the quitters[22].

Conclusion

The present study concludes that smoking cessation has positive outcomes in subjects after ischemic heart diseases in terms of reduced risk of developing future diseases like MI and stroke significantly. Also, smoking cessation, lead to a reduction in the rate of mortality in a 12-month follow-up in the present study. Hence, smoking cessation can be the most advantageous strategy for secondary prevention of ischemic heart diseases and for reducing the risk of ischemic heart diseases in the future. Following ischemic heart diseases smoking cessation should be the prior step by both patient and health care provider. The health care provider should be active in counseling patients for smoking cessation and should enroll patients in smoking cessation programs at the earliest following ischemic heart diseases. The study had few shortcomings including a smaller sample size and follow-up period. Hence, more longitudinal studies with a larger sample size and longer monitoring periods are required to reach a definitive conclusion.

References

1. Mc Namara K, Alzubaidi H, Jackson JK. Cardiovascular disease is a leading cause of death:

how are pharmacists getting involved? Integr Pharm Res Pract. 2019;8:1–11.
2. Jha P. The hazards of smoking and the benefits of cessation: a critical summation of the epidemiological evidence in high-income countries. Elife. 2020;9.
3. Hackshaw A, Morris JK, Boniface S, Tang JL, Milenkovic D. Low cigarette consumption and risk of coronary heart disease and stroke: a meta-analysis of 141 cohort studies in 55 study reports. BMJ. 2018;360.
4. Bonnie RJ, Stratton K, Kwan LY, editors. Public Health Implications of Raising the Minimum Age of Legal Access to Tobacco Products. Washington DC, USA: National Academies Press; 2015. The effects of tobacco use on health.
5. Boehme AK, Esenwa C, Elkind MS. Stroke risk factors, genetics, and prevention. Circ Res. 2017;120:472-95.
6. John G, Pasche S, Rothen N, Charmoy A, Delhumeau-Cartier C, Genne D. tobacco-stained fingers: a clue for smoking-related disease or harmful alcohol use? A case-control study. BMJ Open 2013;3:003304.
7. West R. Tobacco smoking: health impact, prevalence, correlates, and interventions. Psychol Health 2017;32:1018–36.
8. Rosenzweig JL, Bakris GL, Berglund LF, Hivert M-F, Horton ES, Kalyani RR, et al. Primary prevention of ASCVD and T2DM in patients at metabolic risk: an endocrine society* clinical practice guideline. J Clin Endocrinol Metab. 2019;104:3939–85.
9. Song YM, Cho HJ. Risk of stroke and myocardial infarction after reduction or cessation of cigarette smoking: a cohort study in Korean men. Stroke 2008;39:2432–38.
10. Roy A, Rawal I, Jabbour S, Prabhakaran D. 2017. "Tobacco and Cardiovascular Disease: A Summary of Evidence." In Disease Control Priorities (third edition): Volume 5, Cardiovascular, Respiratory, and Related Disorders, edited by Prabhakaran D, Anand S, Gaziano T A, Mbanya J C, Wu Y, Nugent R, editors. . Washington, DC: World Bank.
11. K.A. Epstein, C.M. Viscoli, J.D. Spence, et al.Smoking cessation and outcome after ischemic stroke or TIA. Neurology. 2017;89:1723-9.
12. Bertoluci MC, Moreira RO, Faludi A, Izar MC, Schaan BD, Valerio CM, Bertolami MC, et al. Brazilian guidelines on prevention of cardiovascular disease in patients with diabetes: a position statement from the Brazilian Diabetes Society (SBD), the Brazilian Cardiology Society (SBC) and the Brazilian Endocrinology and Metabolism Society (SBEM). Diabetol Metab Syndr. 2017;9:1–36.
13. Mensah GA, Wei GS, Sorlie PD, et al. Decline in cardiovascular mortality: possible causes and implications.Circ Res 2017;120:366–80.
14. N.A. Rigotti, C. ClairManaging tobacco use: the neglected cardiovascular disease risk factor. Eur Heart J. 2013;34:3259-67.
15. McCarthy, M.; Huguet, N.; Newsom, J.; Kaplan, M.; McFarland, B.: Predictors of Smoking Patterns after First Stroke, Social work in health care. 2013; 52: 467–82.
16. Critchley J, Capewell S. Smoking cessation for the secondary prevention of coronary heart disease. Cochrane Database Syst Rev 2004;1:CD003041.
17. Riegel B, Moser DK, Buck HG, Dickson VV, Dunbar SB, Lee CS et al. American Heart Association Council on Cardiovascular and Stroke Nursing; Council on Peripheral Vascular Disease; and Council on Quality of Care and Outcomes Research. Self-care for the prevention and management of cardiovascular disease and stroke: a scientific statement for healthcare professionals from the American Heart Association. **J Am Heart Assoc.**2017;6:006997.
18. Alvarez LR, Balibrea JM, Surinach JM, et al. Smoking cessation and outcome in stable outpatients with coronary, cerebrovascular, or peripheral artery disease. Eur J Prev Cardiol. 2013;20:486-95.
19. Ambrose JA, Barua RS. The pathophysiology of cigarette smoking and cardiovascular disease: an update. J Am Coll Cardiol 2004;43:1731-7.
20. Kim J, Gall SL, Dewey HM, Macdonell RA, Sturm JW, Thrift AG. Baseline smoking status and the long-term risk of death or nonfatal vascular event in people with stroke: a 10-year survival analysis. Stroke 2012;43:3173-8.
21. Mohiuddin SM, Mooss AN, Hunter CB, Grollmes TL, Cloutier DA, Hilleman DE. Intensive smoking cessation intervention reduces mortality in high-risk smokers with cardiovascular disease. Chest 2007;131:446-52.
22. Jha P, Ramasundarahettige C, Landsman V, et al. 21st-century hazards of smoking and benefits of cessation in the United States. N Engl J Med 2013;368:341-50.

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