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Statistical Analysis

Introduction

Smoking remains a prominent cause of various diseases across the globe, although being the most common preventable cause of disease and death. Most notably, smoking is associated with several different non-communicable diseases, including heart attacks, stroke, several forms of cancer and chronic obstructive pulmonary disease (COPD). According to Habib et al. (2010), there are 1.2 billion smokers globally, with smoking rates in teenagers aged 13 to 15 years accounting for approximately 20% in diverse developed and developing countries. This has led to statistics demonstrating a significant increase in deaths, with Habib and colleagues reporting 4 million deaths annually in 2010, which was expected to increase to 10 million annually by late 2020. However, a report from the World Health Organization (WHO) (2020) revealed that while deaths from smoking had not quite reached these heights, the number of deaths increased to more than 8 million in 2020, with 7 million deaths caused by direct tobacco use. It is averaged that smokers will die ten years earlier than non-smokers (Jha et al., 2013). However, in the US alone, those who inhale second-hand smoke have an increased risk of approximately 41,000 deaths each year (US Department of Health and Human Services, 2014).

Many forms of smoking cessation have been developed in the modern-day and proved to vary in their efficiency and ability to stop the population from smoking tobacco-based products. The simplest form of smoking cessation can be receiving advice and support from health professionals, with this approach also being deemed a highly cost-effective strategy. However, this has not always proved to be the most effective approach due to a lack of support provided to the patient to maintain their motivation to abstain from smoking. While the most recent approaches have included the introduction of vaping and e-cigarettes, some of the more traditional approaches have included the use of smoking cessation sessions.

Stead et al. (2013) investigated the position of the literature on effective smoking cessation to support health improvements in subjects. The study found that many physicians recommend the benefit of intensive interventions compared to very brief interventions, although the benefit is small. The use of smoking cessation classes has been investigated for a significant period, with a study from Altman et al. (1986) suggesting that such use in a community-based intervention is cost-effective and led

to reduced daily smoking consumption. However, early studies have further outlined the challenges associated with smoking cessation programmes regarding their ability to reach smokers in the community (Lichtenstein & Glasgow, 1992), which has led to more debate surrounding the intervention's ability to have the desired effect. In an attempt to reach a wider population, modern-day attempts at smoking cessation have been seen in the introduction of approaches including text messaging-based, social media, mobile applications and the use of health care professional delivered programmes (Liao et al., 2018; El Hajj et al., 2017; Regmi et al., 2017). These approaches have been developed utilising the foundations of cessation programs. However, they have provided a way to reach a wider community which may lead to a greater presence to support and drive the abstinence capabilities of the individual.

The current report is interested in understanding if the use of a smoking cessation intervention is an effective approach to reducing the number of cigarettes smoked on a daily basis. Therefore, the current study aims to investigate if attending three smoking cessation per week for six weeks is an effective approach. Further, the study aims to identify if there is a relationship between years spent smoking and cancer diagnosis. The report initially hypothesises that there will be significant differences in cigarettes smoked between the experimental and control group. The null hypothesis suggests that there will be no significant difference in the intervention on cigarettes smoked post-intervention. Secondly, the study hypotheses that there will be a significant association between years spent smoking and receiving a cancer diagnosis. The null hypothesis states that there will be no significant association.

Methods

Participants

The study recruited 60 male (58.3%) and female (41.7%) subjects aged 21 to 82 years old. All participants were current smokers who had been smoking for a minimum of 1 year. The subjects were separated into two groups: no treatment (placebo) and smoking cessation sessions (experimental). The experimental group received three smoking cessation sessions per week for 6 weeks provided by a local NHS community nurse. To be deemed eligible for inclusion in the study, participants were required to be current smokers, over the age of 18 years and were of sound mind. All data was

held in accordance with the Data Protection Act (2018), and all subjects were assigned a code number to preserve the identity of the participants, such as P001.

Study Procedures

The subject data was collected from 60 participants who had recently attended an appointment at a South East NHS GP surgery. Data was collected relating to number of cigarettes smoked on a daily basis on average pre and post intervention, total years of smoking and if they had received a cancer diagnosis at any stage of their life after the age of 18 years.

At each session, participants attendance was recorded and those that did not achieve 75% or higher where removed from the study. Subjects were asked to reduce their baseline smoking rate by 50% by week 6 with a further aim of achieving smoking cessation. In the experimental group, all participants were required to keep a daily diary of their cigarette consumption and any medications such as nicotine replacement patches to support their journey.

Analysis

The current study used SPSS v.25 software (IBM Inc, Chicago, IL) to analyse the participant's data. To investigate the impact of smoking cessation sessions on reducing smoking and supporting the subjects to achieve smoking cessation. To assess the impact of the intervention, a one-way ANOVA was conducted, with all data presented as (M±SD). Further, to investigate the potential risks of smoking, further bivariate correlations were conducted to identify if years smoking is associated with cancer diagnosis in the sample. The alpha was set at $\alpha = 0.05$.

Results

The study consisted of 60 subjects aged 39.25yrs (±16.40yrs) who had been smoking between 1 to 53 years (12.93yrs±13.48yrs). All participants were from the UK. Prior to engaging in the intervention, the amount of cigarettes smoked daily ranged from 1 to 40 (8.88±7.03) which overall increased to 12.93 (±13.48) post intervention from across the entire sample. The majority of the sample had not received a cancer diagnosis (58.3%).

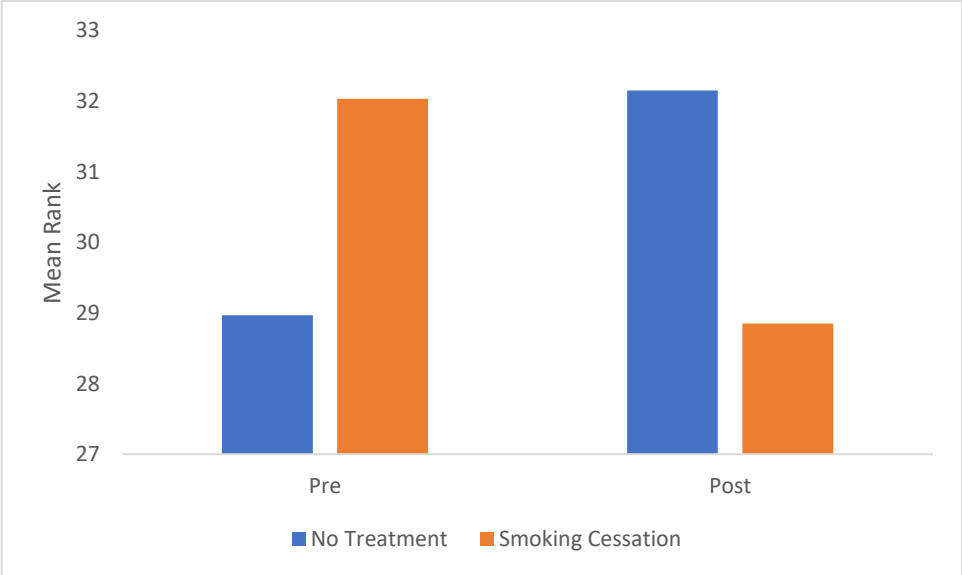
Smoking Intervention

Initially, normality tests were conducted through the use of a Shapiro-Wilk test. The analysis demonstrated that both the pre-intervention daily cigarette consumed, $W(60) = 0.843$, $p < 0.001$, and post-intervention daily cigarettes consumed, $W(60) = 0.753$, $p < 0.001$, were deemed to be not normally distributed. For this reason, the analysis pursued the non-parametric testing, specifically utilising a Kruskal-Wallis one-way ANOVA.

The study identified a non statistically significant difference between the intervention and amount of cigarettes smoked daily, with a mean rank of 28.97 for no treatment and 32.03 for the smoking cessation sessions, ($H(1) = 0.465$, $p = 0.495$). This suggests that prior to the intervention, there was no significant differences present between the groups.

Following the intervention, a further non significant difference was identified between the interventions and the amount of cigarettes smoked daily, with the no treatment group increasing slightly to a mean rank of 32.15 (↑10.98%) and the smoking cessation group reducing slightly to 28.85 (↓9.93%), ($H(1) = 0.538$, $p = 0.463$). This suggests that the intervention was not effective in reducing smoking behaviours in the subjects. Based on these findings, the initially hypothesis is rejected, and the null hypothesis is accepted. An overview of the findings can be seen in figure 1.

Figure 1. *An overview of the mean rank scores for each group from pre to post intervention.*



To determine the risk of smoking and cancer risk, a Pearson's bivariate correlation was conducted. Firstly, years of smoking was found to have a moderate positive correlation with a cancer diagnosis, $r = 0.495$, $n = 60$, $p < 0.001$. However, it was also identified that cancer diagnosis had a large positive correlation with age, $r = 0.640$, $n = 60$, $p < 0.001$. Therefore, as the sample contained a larger proportion of subjects aged 40 years or older, the increasing age may have led to a stronger association being identified.

Discussion

The current report investigated the influence of attending three smoking cessation sessions to reduce daily cigarette smoking and support smoking abstinence. The findings demonstrate that smoking cessation sessions were not a beneficial intervention to support the population. While the study results demonstrate that, on average, a reduction was made in daily cigarettes smoked following the intervention, this did not result in significant deterioration.

In terms of the research aims, the initial aim was to understand if a positive effect of the intervention could be found. However, the findings show that while there was a reduction in daily smoking, this was not statistically significant. Therefore, the study accepts the null hypothesis and rejects the initial hypothesis. In line with previous studies, the findings from the current study further reiterate the view that more must be done to support smokers in reducing their consumption of cigarettes daily but to support abstinence furthermore effectively and efficiently.

The study investigated whether a significant association was present between the number of years spent smoking cigarettes and subjects receiving a cancer diagnosis when considering the second research aim. The study found a positive correlation that allows the acceptance of the hypothesis and rejects the null hypothesis. This poses further support in relation to the health consequences of engaging in the continued use of cigarettes and poses further support for the association between prolonged smoking and cancer risk. Therefore, the present study argues that more must be done to support smoking abstinence to reduce the risk of cancer diagnosis in smokers. This is particularly important in smokers aged 40 years or older as this appears to be the point when the risk of a cancer diagnosis increases further.

Future studies should consider investigating the role of knowledge and awareness of health consequences in current smokers in enhancing motivation and commitment to abstaining from smoking. This could provide an opportunity to develop more effective smoking cessation interventions, including the use of effective technologies to support and reach a wider audience.

Conclusion

The results from the study highlight the need to consider alternative forms of smoking cessation such as e-cigarettes or vaping which are a more modern approach. Following the data, the report does not recommend using smoking cessation sessions to reduce the number of cigarettes consumed significantly. The findings from the current report provide further support to a growing evidence base, prompting the need for more studies to investigate the benefits of adopting alternative ways to help smokers stop progressively and successfully.

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