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"Nicotine Dependence of Young and Older Adults in Relationship with Habitual Perceived Stress and Depression"

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Nicotine product consumption by Indian adolescents have increased. Whether there are noticeable differences between young and older adults, in frequency/volume of cigarette-smoking that correlates with stress and depression? Fagerstrom Test for Nicotine Dependence, Perceived Stress Scale, Beck Depression Inventory and Wisconsin Smoking Withdrawal Scale are well-established psychometric scales that directly/indirectly study Nicotine dependence and associated stress, anxiety, depression and withdrawal symptoms. This paper attempts to demonstrate the statistical power by correlating individual selective items over total variable scores of these four scales and compare young adults with adults. The study includes smoking in volume, frequency and timing, and correlates with four sub-variables of inter-dimensional scales namely 'guilt', 'trouble getting cigarettes off the mind'; 'sleeping pattern disturbances' and 'consequent tobacco consumption'; 'anger' with 'frequency and volume of smoking'; volume of smoking per day with tensed/anxious conditions and urge to smoke in stressful conditions. Relationships of these selected sub-variables, for comparing young adult and adult smokers are documented. A total of 83 young adult smokers in the age group of 18 and 25 years and 79 adult smokers in the age group of 26 and 60 have been considered from a wide distribution of the Indian demography. Agreements and deviations with other published works have also been documented. Paired 't' tests for group comparisons and Pearson's correlation coefficients between variables have been computed for the frequencies of the feedbacks on 69 validated questions in four dimensions. Internal consistency has been tested using Chronbach's alpha..

Keywords: Adult/young adult smokers; Smoking volume; Guilt; Stress; Anxiety; Withdrawal symptoms

Most of the tobacco product consumers believe that smoking reduces their stress level. But tobacco consumption creates issues on the psychological wellbeing, apart from physiological ones, as smoking creates a temporary feeling of relaxation which is often followed by increased levels of stress and anxiety (Chadda, et. al., 2002). Individuals who suffer from depression might smoke twice as much as a non-smoking person (Joseph et. al. 2019, Deanna et. al. 2011); but the intensities and timing of smoking in a day may vary. However, applied psychological interventions would steadily bring down the desire of the individuals to use nicotine (Umesh Wadgave et. al. 2016). Continuous research on volume, timing of smoking and the relationships with stress and depression are thus necessary for promoting tobacco cessation interventions. It is to uplift the motivation of the smokers to help in identifying the difficulties, particularly for adolescents as they might be at the highest risk of depression (Wight. R. G et. al. 2004). Appropriate validated psychometric scales are needed for conducting surveys for documenting the behaviour of smokers in experiencing depressive symptoms by adults and adolescents. Fagerstrom Test for Nicotine Dependence (FTND, Heatherton et. al. 1991), Perceived Stress Scale (PSS, Cohen et. al. 1983, West et. al. 2006), Beck Depression Inventory (BDI, Paul Richter et. al. 1998) and Wisconsin Smoking Withdrawal Scale (WSWS, Welsch et. al. 1999) are well established/validated scales. Comparing older adults (adults) with younger adults (adolescents) on their respective tobacco consumption patterns, with selective sub-

variables of these four scales, would document findings on smoking with anxiety, stress and depression through an empirical research study. The findings will be of immense use for further research as well as establishing utility values to applied psychology.

Jayakrishnan, R et. al. (2012) studied rural smokers (18 to 60 ages) of Kerala, by considering 6 items of FTND and reported the dependence to nicotine was higher when both cigarette and bidi (locally rolled tobacco leaves) were considered and found that more literate the consumers, lesser the dependence to nicotine. (Weber, C. F et. al. 2017) documented the dependence of individuals on their smoking habits, when Kuder-Richardson Coefficient of Reliability was used in FTND and found that gender did not matter with the dependence of nicotine. High consumers found it difficult to control their habit of smoking even in prohibited places. They also reported it was difficult not to smoke during sickness (bed rest). It was reported that the individuals who depended on nicotine more came from a background of lower education and income. Mikami, I et. al. (1999) used a semi-interview method focusing on nicotine dependence (FTND) of cancer patients who found it difficult to give up the habit despite their condition. The reliability and validity of the scale were reassessed due to the language modification in the scale, and showed significant correlation with nicotine dependence. Jhanjee, S and Sethi, H (2010) studied on Indian smokers to test the reliability/validity (FTND) and reported, low reliability (but Cronbach's alpha improved with two factors study). Soneji, S et. al. (2015) surveyed on tobacco related products (hookah, e-cigarettes, cigarettes, little filtered cigars) among adults and adolescents. The association between demography and behaviour with consumption levels of current tobacco products was conducted using the ordinal logistic regression model. The usage of tobacco was higher among males when compared to females. Frederiksen. L. W and Frazier. M (1977) wanted to understand the relationships between overall smoking rates and temporal distribution of cigarette consumption in high, moderate and light smokers. The mean hour of smoking correlated high during the early hours of the day and reduced drastically during the rest of the day.

Naquin, M. R and Gilbert, G.G (1996) studied the smoking behaviours of college students and analysed their coping styles when dealing with stress (PSS). The results indicate that the perceived stress was significantly higher among the students who were currently into the habit of smoking when compared with the non-smoking students. Stubbs, B et. al, (2017) conducted a cross-sectional study and found there is a relationship between perceived stress and smoking habits in low and middle-income countries when compared to high income countries. Slopen, N et. al, (2013) related psychosocial stressors with persistence smoking, cessation and relapse, and reported that persistent smoking are related to variables such as finances, relationships, work, conflicts within the family. Hajek, P et. al, (2010) studied the effect of post-cessation of tobacco (PSS) and reported many smoked as a coping mechanism for their perceived stress. Participants included abstinence from smoking for a longer period of time due to treatment guidelines. The study proved that smokers who have quit smoking for more than a year, were able to greatly decrease their perceived stress when compared to smokers. Cougle. J. R et al. (2013) researched the relationship between smoking behaviours of people and psychiatric issues on problematic anger and found that individuals who smoked daily/heavily or were heavily dependent on nicotine for the past year were associated with problematic anger (due to failed attempts in quitting the habit). Karekla. M et al. (2017), found relationships between stressful situations and smoking, which were analysed based on the ways the individual experienced emotionally and physiologically. Negative emotions increased while positive decreased at the end of their experiment.

Relationship between tobacco and depression (and motivation to quit with self-efficacy) has been studied using BDI scale (Haukkala, A et al, 2000). ANOVA/ANCOVA results showed that the participants who smoked had higher depression scores when compared

to those who quit smoking or never smoked in their life. It also showed that individuals who had higher depression scores were ready to put more effort into cessation of the habit than those who scored low. More the depression score, more was the motivation among the participants. Tselebis, A et al (2003) assessed the relationship of smoking behaviour with depression and anxiety with physicians who were either smokers, non-smokers or former smokers, using Spielberger State Trait Anxiety scale and BDI to measure the depression levels. Individuals who currently smoked, experienced more amount of anxiety than the non-smokers and former smokers. The study also showed that the anxiety levels with former smokers were lower than the anxiety levels of non-smokers. It was found that the number of cigarette consumption did not play a significant role in deciding the increase or decrease in anxiety levels. Wetter. D. W and Young. T. B (1994) carried out a longitudinal study using Diagnostic Statistical Manual of Mental Disorders (DSM) criteria, on symptoms related to insomnia, parasomnia and hypersomnia. The results showed smokers were found it hard to fall asleep and wake up easily, irrespective of gender. It was concluded that smoking habits interfered with normal sleeping patterns of the individuals. Etter, J. F., and Hughes, J. R. (2005) compared the efficiency of measurement of three different smoking withdrawal scales namely WSWS, Cigarette Withdrawal Scale and the Minnesota Withdrawal form and did not find much difference among these variables. Although the three scales had different variables, they did not seem to have an edge over the other and were on par with each other. Etter. J (2005) assessed quantitatively the validity of cigarette withdrawal scale through a virtual study on the internet in different intervals. The scale met the requirements of the Diagnostic and Statistical Manual and the International Classification of diseases. The scale was reliable and could measure multi-dimensional aspects of the cigarette withdrawal symptoms. West. R et al. (2006) identified the strengths and weaknesses among 4 established (DSM-4) and a new scale designed to measure the nicotine withdrawal symptoms. The time duration of smoking would be sufficient enough for the withdrawal symptoms to show signs with the participants. The variables included depression, restlessness, insomnia, anxiety, irritability, poor concentration and hunger. The study showed that each scale among the five, showed their own signs of weakness and advantage even though the size of the scale differed. Welsch, S. K et al. (1999) experimented the validation of the WSWS and revealed coefficient alpha between 0.75 and 0.93. An early time course of smoking withdrawal has been reported by Hendricks. P. S et al. (2006) using WSWS (in Korean) within the laboratory. The participants who abstained from smoking have displayed greater withdrawal than the participants who smoked. Zuzelo. P. R (2017) explained how many smokers failed to complete the cessation program successfully were shamed and stigmatized by the society. Cessation programs should include guilt and shame as experienced by the smokers from both family and society as many studies have shown a link between smoking and the above psychological factors. Both guilt and shame can trigger a person to become more induced in smoking than actually reducing that habit. Niezabitowska. A et al (2022) verified whether there was an indirect connection between the tolerance to distress and nicotine with other variables (reduction of tension and habitual smoking). There was an indirect relationship between the dependence of nicotine with tolerance of distress. This indicates that subjects who had low tolerance to distress were more prone to nicotine dependence. Wills, T.A et. al, (2001) studied with coping dimensions of adolescent substance users and classified into two categories: engagement (physical, behavioural and cognitive coping) and disengagement (avoidance, anger, helpless and hangout coping) and reported: greater the stress, greater the coping effects. Grover, S et al, (2020) debated whether sociodemographic factors have an influence over the usage of tobacco, in age groups of 15-24 years. It was found that a large tobacco consumers fell within 20-24 years.

With literature supports, associative hypotheses have been constructed with a basic assumption that tobacco consumption will interfere with the quality of life. The hypotheses

relating the tobacco consumption patterns and the chosen psychometrics (perceived stress, depression and anxiety) are constructed with the help of the four validated scales. H1: The guilt experienced by the tobacco users is related with the inability to get cigarettes out of their minds (Zuzelo. P. R, 2017); H2: The frequencies of disturbances in sleeping patterns influence tobacco consumption in the following day (Wetter. D. W and Young. T. B, 1994); H3: The volume of smoking is influenced by anger (Cougle. J. R et al. 2013); Stressful conditions urge the subject to indulge in smoking (Karekla. M et al. 2017); H4: Anger (tension or anxiety, Niezabitowska. A et al. 2022) has an impact on the usage of cigarettes; H0: There is a significant relationship among Indian Young adults and Adults in the volume and frequency of consumption of cigarettes (Null hypothesis).

Method

This empirical research used survey method administered on four dimensions using the four scales, denoted by: D1-FTND; D2-PSS; D3-BDI and D4-WSWS. The scale values of the variables of each dimension consist of, total number of items of the scale; number of items measured and the range of the scales: D1 (6, 6, 'no range'), D2 (10, 1, 0 to 4), D3 (21, 1, 0 to 3), and D4 (28, 3, 0 to 4). The FTND scale (originally Fagerstrom Tolerance Questionnaire) comprised of 6 items which helped to measure the quantity of cigarette consumption, the intensity of requirement to consume and the dependence of nicotine to the smoker. The PSS's 10 scale items helped in analysing how situations affected the way one feels and perceived the stress. The BDI's 21 items helped to analyse the existence and intensity of the depressive symptoms. The WSWS consists of 28 items (7 subscales measuring anger, anxiety, concentration, craving, hunger, sleep and sadness) that measured major symptoms caused by nicotine. FTND items are dependent variables as the consumption of tobacco and frequencies might depend on stress and anxieties, while the other scale items are independent.

The 6 dependent variables and their scale values of FTND (D1): Q1-How soon after you wake up do you smoke your first cigarette? [(0) After 60 minutes; (1) 31-60 minutes; (2) 6-30 minutes; (3) Within 5 minutes]. Q2-Do you find it difficult to refrain from smoking in places where it is forbidden? [(0) No; (1) Yes]. Q3-Which cigarette would you hate most to give up? [(1) The first in the morning; (0) Any other]. Q4-How many cigarettes per day do you smoke? [(0) 10 or fewer; (1) 11-20; (2) 21-30; (3) 31 or more]. Q5-Do you smoke more frequently during the first hours after awakening than during the rest of the day? [(0) No; (1) Yes]. Q6-Do you smoke even if you are so ill that you are in bed most of the day? [(0) No; (1) Yes]. The independent variables of the other three scales are delimited to one, four and three for PSS, BDI and WSWS respectively. The PSS scale values are: In the last month, how often have you been angered because of things that were outside of your control? [0 = Never 1 = Almost Never 2 = Sometimes 3 = Fairly Often 4 = Very Often]; For BDI: I don't feel particularly guilty [0], I feel guilty a good part of the time [1], I feel quite guilty most of the time [2], I feel guilty all of the time [3]; and for WSWS: I have been tensed or anxious, I awake from sleep frequently during the night, I have had frequent urges to smoke, while the scales are [0 Strongly disagree1 disagree 2 feel neutral 3 Agree 4 Strongly agree].

In FTND (dependent), the item Q5-D3 'guilt' and (out of 21 questions of) the BDI is considered as a single sub-variable for the purpose of correlation (power of statistical analysis, Zhou, X.,et. al, 2018). Q1-D2 'Stressful condition' (out of 10) of the PSS; 'anger' (Q9-D2) (out of 10) of the PSS are considered. Three sub-variables of WSWS, Q5-D4 'sleeping pattern', Q9-D4 'urge to smoke', Q3-D4 'tension or anxiety' and 'trouble getting cigarettes off the mind' (Q26-D4) (out of 28) items are considered.

Operational definitions: 'Young Adults': Individuals (student/employee/freelancer) of Indian origin (age between 18 and 25) of any gender. 'Adults': Individuals of Indian origin (age between 26 and 60) of any gender. Appropriate intrusive controls have been adapted.

The sampling is based on purposive sampling (Sharma B.A.V 1988). The locale of

79 adult samples were from five states of India. The cities/towns of the corresponding states are listed along with number of samples: Tamil Nadu (Chennai 52, Nagerkoil 4, Madurai 5, Salem 1 and Cuddalore 1) 79.75%; Kerala (Ernakulum 1, other 1) 2.53%; Maharashtra (Mumbai 2) 2.53%; Karnataka (Bangalore 8, Hubli 2) 12.65%; Rajasthan (Jaipur 1) 1.26%; and Uttar Pradesh (Noida 1) 1.26%. The locale of 83 young adult samples is from nine states of India. They are: Tamil Nadu (Chennai 46, Coimbatore 10, Kumbakonam 1, Karaikudi 2, Hosur 1) 72.29%; Karnataka (Bangalore 7) 8.43%; Maharashtra (Mumbai 5, Dombivli 1) 7.23%; Kerala (Kochi 1, other 1) 2.4%; Haryana (Gurugram 1) 1.2%; Telengana (1) 1.2%; Assam (1) 1.2%; Delhi (3) 3.61%; and Rajasthan (Jaipur 2) 2.4%.

These 162 samples were collected from volunteers of National Social Service schemes of colleges; Tobacco Cessation Centre at Cancer Institute (Women India Association), Adyar, Chennai; and through social platforms, resulting in snowball effect. Measures of central tendencies are: Mean, Median, Standard deviations, Paired t-tests, Pearson's correlation coefficients and Cronbach's alpha.

Results

D1 FTND of young adults (no missing data), have mean scores of .3253, .1446, .3614, .0723, .3494 and .1325 for Q1 to Q6 respectively. Median score is 0.0 for all the items; the range of scores are 3.00, 1.00, 1.00, 2.00, 1.00 and 1.00 respectively. The standard deviations are .73432, .35381, .48334, .30376, .47968 and .34113 for the 6 Qs. The data for adults in D1 (no missing data) have mean values .6962, .5443, .4430, .1519, .6962 and .5063 for Q1 to Q6. Median values for Q2, Q5 and Q6 showed 1.00 while the rest are 0.00. The range of scores are same as young adults. The standard deviations are .82204, .50122, .49992, .45541, .46283 and .50315 for Q1 to Q6.

Pearson's correlation coefficients are computed between the chosen sub-variable item(s). Paired 't' tests are used for comparison between groups (adults and young adults) for the correlated parameters.

In FTND, the 't' critical value for 78 degrees of freedom and 0.05 significance is +/- 1.9914. This is used for comparing the 't' and 'p' resulted for adults and young adults (Table 1).

Table 1. 't' Test Results in Comparing Young Adults (YA) with Adults (A) on FTND

Item	't'	'p'	Comparison
Q1 YA–A	-2.560	0.012	Significant
Q2 YA–A	-5.219	0.000	Significant
Q3 YA–A	-.799	0.427	Insignificant
Q4 YA–A	-1.229	0.223	Insignificant
Q5 YA–A	-5.066	0.000	Significant
Q6 YA–A	-5.388	0.000	Significant

Three levels of relationships between 'guilt' and 'trouble getting cigarettes off the mind', 'anger' and 'volume of smoking', 'urge to smoke' and 'stressful conditions' are shown in Table 2. Values are for young adults (adults showed similar values with no noticeable difference).

Table 2. Correlation of Sub-variables

Sub-Variables	Pearson Correlation coefficient	Significance level	Relation-ship
Q5 D3 & Q26 D4	-0.122	0.273	weak –ve correlation
Q4 D1 & Q9 D2	0.000	1.000	No correlation
Q9 D4 & Q1 D2	0.422	0.000	Strong +ve correlation

Discussion

Internal consistency (Cronbach's alpha) for the total responses is 0.899 and compared well with 0.70 of Jayakrishnan, R et. al. (2012), 0.66 of Mikami, I et al (1999), 0.57 of Jhanjee, S and Sethi, H (2010) and 0.75/0.93 of Welsch. S. K et al (1999).

In D1 FTDN, about 75% of young adults smoked after one hour of morning wakeup while about 30% of adult samples smoked within one hour and 15% smoked within half an hour, indicating the urge was more with adults. About 80% of young adults did not find it difficult to refrain from smoking in public places, whereas

about 50% of adults found it difficult in refraining. More than 50% of young adults and adults would like to give up first cigarette in the morning. More than 75% of both smoked less than 10 cigarettes per day. Over 60% of young adults do not wish to smoke in the first hours whereas about 70% of adults wanted to. More than 80% of young adults did not want to smoke in bed when ill whereas more than 50% of the adults wanted to smoke. In Q1 alone, the standard deviation value is higher (>0.7 for young adults and .0.8 for adults), while other values are well within the least scale score, indicating less deviations. Paired 't' tests (Table 1) show significant differences between young adults and adults and thus Null hypothesis H0 is rejected.

The 'guilt' (BDI-D3) and 'trouble getting cigarettes off the mind' (WSWS-D4) are negatively and weakly correlated (Table 2). In the case of adults, the median of WSWS-D4 is high (4.0) showing getting cigarettes off their mind was difficult, (agreement with Zuzelo. P. R 2017, "The guilt feeling among smokers is due to social avoidance of smokers by non-smokers"). Hypothesis H1 is thus accepted. Positive correlation (0.312) is seen (adults and young adults) with sleeping disturbances and smoking more frequently during the first hours after awakening. No correlation is found between 'anger' of PSS (Q9-D2) with 'volume of smoking' and Hypothesis H4 is thus rejected. Smokers are found to be at greater risk in sleep-disordered breathing with that of never smokers (Wetter. D. W and Young. T. B 1994). Relationship between sleep disorder and smoking is found and agrees with these authors and Hypothesis H2 is accepted. The frequency of 'urges to smoke' Q9-D4 of WSWS and the 'stressful conditions' of PSS (Q1-D2) shows +ve correlation. The adult subjects being upset, is analysed separately and found to be weak for both adults and young adults and hypothesis H4 is therefore accepted. Smoking urges (desire to smoke and negative affect relief) and stress is significantly increased, agreeing with Karekla. M et al. (2017). In both stressful conditions and urge to smoke, the adults seem to be more influenced than young adults. The findings of Niezabitowska. A et al. (2022) suggest that individuals with low level of distress tolerance are especially prone to nicotine dependence. If they use smoking as a coping mechanism, then it becomes habitual. This is in contrast with our finding. Nevertheless, our study is on direct relationship between volume of smoking with tensed/anxious conditions. Our results are contrary to the findings reported by Grover, S et al, (2020) as young adults showed very low dependence on smoking cigarettes.

While 10% of adults might require withdrawal treatments, only about 5% of young adults may require withdrawal treatments. Biswas, B., et al (2019) have referred the standardised scoring of the stress levels and the range for our study shows similar results for young adults and adults. For young adults, low stress, moderate stress and high perceived stress (revealed by 2, 76 and 5 of PSS). In the case of adults, the total scores are 4, 68 and 7 respectively. Both the young adult and adult tobacco consumers have moderate stress levels of the PSS. In our case (young adults) Normal behaviour, Mild mood disturbance, Borderline clinical depression, and Moderate depression, Severe and Very severe conditions have been revealed by 43, 14, 6, 16, 2 and 2 respectively (in the case of adults, the scores are 26, 15, 13, 21 4 and 0). It is inferred that young adults showed less depression compared with adults on the BDI scale (Wang, Y. P., et. al, 2021). The sub variables of WSWS which had reverse scoring (Q 1, 2, 4, 7, 10, 17, 22, 24) show a normal distribution. Both the young and older adults have not exhibited strong feelings of withdrawal symptoms.

Conclusion

There is no significant observable relationship in tobacco usage patterns between young and older adults of India. There is an influence on tobacco usage patterns in perceived stress, depression and anxiety. The impact of tobacco usage is severe only in specific cases. It is concluded that there is a significant difference between adults and young adults in their smoking habits in volume and frequency relating to stress, depression and anxiety.

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