PICTORIAL HEALTH WARNING LABELS (HWLs) IN SMOKING CESSATION - A SYSTEMATIC REVIEW

BACKGROUND

- Tobacco is a very unusual consumer product that is highly addictive and kills around half of its long-term users.
- Today, tobacco consumption leads to 1 in 10 deaths among adults worldwide - more than five million people a year [1].
- Thus, to curb this tobacco epidemic, development of effective programmes has become necessary to protect people from contracting tobacco-related diseases and premature deaths. This can be achieved by making use of the tobacco product packaging itself. [2]

INTRODUCTION

- The World Health Organization (WHO) Framework Convention on Tobacco Control (FCTC) Article XI requires the implementation of large (30% and preferably 50% of pack) warnings on tobacco products, which may include pictures. [3]
- About 180 parties, representing 89% of the world's population, have joined this global tobacco control treaty. [4]
- India has also implemented pictorial health warning labels (HWLs), and a third revision has been done with 85% coverage of cigarette packets. However, the effectiveness of HWLs in the control and prevention of smoking habits is still unclear. [5]

RATIONALE

- Various countries have adopted different kinds of approaches in terms of the design of health warning labels and content.
- With pictorial warnings being implemented and continuously changing around the world, there is a need to collect evidence and evaluate role of pictorial HWLs on cigarette packs in changing smoking behaviour.

AIM AND OBJECTIVES

- **AIM :** To collect evidence regarding role of pictorial HWLs in smoking cessation.
- **OBJECTIVES :**
- To evaluate role of pictorial HWLs on cigarette packs in changing smoking behaviour, i.e avoiding cigarettes, forgoing cigarettes and a reduction in consumption post exposure to pictorial HWLs.
- To evaluate pictorial HWLs' effectiveness on intention or motivation to quit smoking.

MATERIAL & METHODS

SEARCH STRATEGY :

- We used a comprehensive search strategy to locate studies relevant to this review. The search strategy involved 3 steps:
- First, a systematic and comprehensive literature survey was carried in electronic data bases like Pubmed, Google scholar, IndMed, and Index Copernicus with MeSH terms "tobacco products" and "health" and keywords like "cigarette", "warning", "labels", and "plain packaging" for articles published until April 2017.
- Second, we examined the reference sections of 2 narrative reviews on cigarette pack warnings.
- Third, we examined the reference lists of the final set of articles in our review.

DATA EXTRACTION & ANALYSIS:

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                    DATABASE SEARCHING
                           │
        PubMed & Google Scholar (MeSH terms
        "Tobacco products", "Health" & keywords
      "Cigarette", "Warning", "Labels", "Plain Packaging")
                           │
  Reference                                    Duplicates
  lists (24) ──  850 titles & abstracts      removed (10)
               identified on 01/04/17
                           │
  Fulfilling search   Potentially relevant    Articles excluded after going
  criteria            titles (840)            through abstracts(82)
                                              • Studies involving only non
                                                smokers
                      113 abstracts screened  • Review articles
  Fulfilling                                  • No original data
  inclusion &                                 • No pictorial warning
  exclusion                                   • Other outcome measures
  criteria            31 full text studies    • Inadequate study design &
                      identified                population
  15 studies                                  • No statistical estimates
  excluded                                    • Proposed warnings
  following           16 included in this     • Inadequate quality of study
  exclusion           systematic review
  criteria after                              1 article was hand
  going through                               searched
  full text
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QUALITY ASSESSMENT

Table 1 : Quality assessment of various studies included in the systematic review using Modified Quality Assessment Tool for Observational Cohort and Cross-Sectional Studies NHLBI, NIH

* (NC = not clear NM = not mentioned NA = not applicable)

Author, study area & year	Fathelrahman Al et al[6], Thailand, 2013	Moodie C et al, UK, 2013	Thrasher JF et al, Mexico, 2012	Nagelhout GE et al, France & UK, 2015	Berg CJ et al[10], USA, 2011	Azagba S et al[10], Canada, 2013	Sujirarat D et al[11], Thailand, 2011	Gravely S et al[11], Uruguay, 2016
Research question/objective clear	1	1	1	1	1	NC	1	1
Study population clearly stated	1	1	1	1	1	1	1	1
Participation rate >50%	0	1	0	0	0	NC	NC	1
Recruitment from same population	1	1	1	1	0	1	1	1
Inclusion-exclusion criteria applied	1	0	0	1	0	1	0	1
Sample size justification	0	0	1	0	1	0	0	0
Sufficient time frame	1	1	1	1	NA	1	1	1
Warning implemented prior to outcome	1	0	1	1	NM	1	0	1
Different levels of exposure assessed	1	0	1	0	1	0	1	0
Exposure(s) assessed more than once	1	1	0	1	0	1	0	1
Clear & valid outcome measures	1	1	1	1	0	0	1	1
Blinding	0	0	0	0	0	0	0	0
Statistical adjustment for confounding factors	1	1	1	1	0	1	0	1
OVERALL SCORE & QUALITY	10 (good)	8 (good)	9 (fair)	9 (fair)	4 (poor)	7 (average)	7 (average)	10 (good)

Author, study area & year	Brennan E et al[9], Australia, 2015	Szklo AS et al[13], Brazil, 2016	Thrasher JF et al[18], Canada & Australia, 2016	Nicholson A et al[17], Australia, 2017	Hammond D et al[15], Canada, 2003	Shojaeza deh D et al[18], Iran, 2014	Mallikarj un S et al[20], India, 2014	Hammod D et al[21], Canada, 2004
Research question/objective clear	NC	1	1	1	1	1	1	1
Study population clearly stated	1	1	1	1	1	1	1	1
Participation rate >50%	1	NA	NM	0	1	1	NM	NA
Recruitment from same population	1	1	NM	1	1	1	1	1
Inclusion-exclusion criteria applied	1	1	1	1	0	1	1	0
Sample size justification	0	1	0	0	0	0	1	1
Sufficient time frame	1	1	1	1	1	NA	1	1
Warning implemented prior to outcome	1	1	1	1	0	0	1	1
Different levels of exposure assessed	0	0	0	0	0	0	0	1
Exposure(s) assessed more than once	1	1	1	1	1	NA	NA	NM
Clear & valid outcome measures	1	1	1	1	0	1	1	1
Blinding	0	0	0	0	0	0	0	0
Statistical adjustment for confounding factors	1	1	1	1	0	1	0	1
OVERALL SCORE & QUALITY	8 (fair)	9 (fair)	8 (fair)	9 (fair)	8 (fair)	8 (good)	9 (fair)	9 (good)

RESULTS

Table 2 : Characteristics of included studies & brief description of results

* (AOR = adjusted odd's ratio OR = odd's ratio CI = confidence interval)

AUTHOR, STUDY AREA & YEAR, STUDY DESIGN	AGE RANGE	SAMPLE SIZE	OUTCOME MEASURES	CONFOUNDERS	BIAS	SALIENCE	COGNITIVE REACTION	FORGOING CIGARETTE	INTENTION TO QUIT	ABSTINENCE
Fatheirahman Al et al[6], Thailand, 2013, Longitudinal	20-56 years	1370 factory made cigarette smokers	Demographics Salience Interest in quitting Quit attempts	Age, gender and rural/urban differences	Selection bias	AOR at 95% CI = 0.99 (0.92-1.09)	AOR at 95% CI = 1.19 (1.07-1.32) P<0.001	AOR at 95% CI = 2.32 (1.60-3.39) P<0.01	AOR at 95% CI = 2.85 (1.79-4.53) P<0.001	-----
Moodie C et al, UK, 2013, Cross sectional	11-16 years	1401 adolescent smokers	Smoking status Salience Depth of processing Comprehension & credibility Persuasiveness Avoidant behavior	Age, gender and rural/urban differences	Selection bias, outcome bias	AOR at 95% CI= 0.526 P=0.032	AOR at 95% CI= 1.28 P=0.444	AOR at 95% CI= 0.897 P=0.782	-----	
Thrasher JF et al[7], Mexico, 2012, Longitudinal	>18 years	1,855 (2010) to 1,730 (2011)	Recognition of specific warnings and reactions to them Reasons to quit smoking	Monthly income, marital status, age, sex, education	Selection bias	63%	-----	-----	AOR CI= 2.50 (1.33-4.70)	AOR at 95% CI= 2.44 (1.27-4.72)	
Nagelhout GE et al[8], France & UK, 2015, Longitudinal	France=11, 12 years; UK=13.36 years	Baseline=63 66 current smokers Follow-up = 2663	Warning salience Cognitive responses Forgoing cigarettes Avoiding warnings	Age and gender	Outcome bias	OR at 95% CI UK= 1.30 (0.99-1.70) France= 0.81 (0.66-1) p<0.05	OR at 95% CI UK= 1.34 (1.16-1.58) France=0.70 (0.55-0.88) p<0.01	OR at 95% CI UK= 1.65 (1.25-2.16) France= 0.83 (0.69-1) p<0.001		
Berg CJ et al[10], USA, 2011, Cross sectional	16-29 years	2600	Smoking prevalence Effectiveness of different styles of pictorial warnings	Age, gender, ethnicity, educational status	Social desirability bias	-----	-----	-----	31.5% for gruesome images 34.58% for testimonial	
Azagba Set al[10], Canada, 2013, Longitudinal	15 years and older	4,853	Smoking prevalence and quit attempts	Gender, age, educational attainment, income level, marital status, household size, employment status, and immigration status.	Outcome bias, Bias due to confounding	-----	-----	-----	OR= 1.331; CI= 1.175-1.508	
Sujirarat Det al[11], Thailand, 2011, Longitudinal	17-65 years	521 workers	Cigarette smoking behavior Success in quitting smoking Failed to quit smoking	Age, income, smoking behavior, age at first smoking, cigarette cost	Outcome bias, recall bias	-----	-----	-----	-----	20.2% at 1 year follow up
Gravely Set al[11], Uruguay, 2016, Longitudinal	18 years of age or older	1746 smokers	Smoking frequency, Previous quit attempts, Salience, Cognitive and Behavioral reactions	Sex, age group, smoking status, city, education, income, time in study	Bias due to novelty effect	OR at 95% CI= 1.44(1.07-1.93) P>0.05	OR at 95% CI= 1.66(1.27-2.19) P<0.001	OR at 95% CI= 3.42(1.77-6.59) P<0.001	OR at 95% CI= 1.76(1.34-2.29) P<0.001	
Brennan E et al[9], Australia, 2015, Cohort	18-69 years	Baseline=42 40; follow-up= 3125	Quitting-related cognitions Pack concealment Quit attempts Health warning effectiveness	Gender, age by education, state of residence, socioeconomic status and likeliness of Smoking Index	Selection bias	OR at 95% CI= 1.35(0.83-1.33) P<0.01	-----	-----	OR at 95% CI= 2.15(1.59-2.91) P<0.001	
Szklo AS et al[13], Brazil, 2016, Longitudinal	18 years and older	37,317 in 2008, and 60,237 in 2013	Quit attempt status Importance of health warnings to help cessation	Gender, age, educational level and degree of nicotine dependence	Survival bias	-----	-----	-----	33.1% P<0.01	
Thrasher JF et al[18], Canada & Australia, 2016, Longitudinal	18-64 years old	Australia: 923 Canada: 915	Self-efficacy to quit, Quit attempts, Threat responses to pictorial HWLs, Reactance	Age and gender	Selection bias, attrition bias,	-----	-----	23% P<0.05	61% P<0.05	
Nicholson A et al[17], Australia, 2017, Cohort	>18 years of age	Baseline=15 49; follow-up= 739	Thoughts and Behaviors That Relate to Quitting Knowledge About the Health Effects of Smoking	Age, sex, remoteness, education, cigarettes per day, plain packaging and other policy-relevant variables	Social desirability bias, attrition bias	64% at 1 month follow up AOR at 95% CI= 1.84 (1.20-2.82) P>0.06	-----	36% at 1 month follow up P>0.02	63% at 1 month follow up P>0.94	11% at 1 month follow up P>0.02
Hammond D et al[15], Canada, 2003, Longitudinal	>18 years	622 adult smokers	Smoking behavior, Intention to quit, Knowledge of the warning labels, Depth of cognitive processing	Age, gender, smoking status	Selection bias	70.1%	OR at 95% CI= 1.07 (1.03-1.12) p<0.001	-----	AOR at 95% CI= 2.22 (1.26-3.91) ≥1.2% at follow up	10.8% at follow up
Shojaezadeh D et al[18], Iran, 2014, Cross sectional	25.00±9.12 years	500 male smokers	Efficacy of health warning labels, Number of quits, number of cigarettes consumed in a day, cigarette supply method, and preference to use cigarettes with or without labels	NA	Selection bias	-----	-----	42.5% P<0.001	32.5% P<0.001	5.6%
Mallikarjun S et al[20], India, 2014, Cross sectional	<85 years	263 bus drivers	Exposure and response to warnings, knowledge, intention to quit smoking and level of nicotine dependence	NA	Selection bias	80.6%	-----	66.3%	72.9%	
Hammod D et al[21], Canada, 2004, Cross sectional	Mean age= 38.7±13.7 years	191 former smokers	Smoking behavior, demographic variables, Decision to quit	Age, gender, cigarettes per day prior to quitting, and the number of years as a smoker.	Hindsight bias	-----	-----	-----	OR at 95% CI= 0.94 (0.90-0.99)	OR at 95% CI= 2.78 (1.20-5.94)

DISCUSSION

- All 16 studies included in this review were observational studies; 9 were longitudinal surveys, 5 were cross sectional, and 2 were cohort studies.
- These studies were conducted in 12 different countries, and 2 studies pertaining to role of plain packaging were from Australia [14, 17].
- The methodological variability in terms of exposure measurement, study design and population, statistical analysis, and adjustments was very large across the selected studies.
- Some studies assessed pictorial HWLs using cognitive measures [6,7,9,13,17-19,20] and emotional reaction based on various warnings types, which showed mixed result.
- It can be reported that HWLs are well noticed [6-9,14,17,18,20] and motivate [6,8,10,11,13,14,16-21] individuals to quit. This review also suggests that pictorial HWLs often leads to forgoing or avoiding cigarette by smokers [6,7,9,13,17,19,20].
- Abstinence rates post exposure to HWLs varied from 5.6% [19] to 20.2% [12] for 1 year follow up.

LIMITATIONS

- The research included in this review consists of a wide range of study designs conducted in diverse cultural and geographic settings. As a consequence, there are constraints on the generalisability of this evidence.
- Most of the studies on pictorial warnings are qualitative in nature.
- Most of the studies reported abstinence from smoking post exposure to pictorial HWLs, which does not attribute to actual quitting rates. Hence long-term cohort studies are required to assess the role of HWLs in actual cessation of habit.

CONCLUSION

- There is fair evidence from heterogeneous studies that pictorial health warning labels are effective in changing smoking behaviour leading to deeper cognitive reactions and increase forgoing cigarettes and intention to quit.
- Moreover, the implementation of an intention to quit smoking into actual and sustained behavioural change as an outcome needs to be further assessed.
- Plain packages are even more effective, and efforts are necessary for universal implementation

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