Exposure to health misinformation about COVID-19 and increased tobacco and alcohol use: a population-based survey in Hong Kong

Tzu Tsun LUK[1], Shengzhi ZHAO[1], Xue WENG[1], Janet Yuen Ha WONG[1], Yongda WU[1], Sai Yin HO[2], Tai Hing LAM[2], Man Ping WANG[1]

[1]School of Nursing, The University of Hong Kong, Pokfulam, Hong Kong SAR

[2]School of Public Health, The University of Hong Kong, Pokfulam, Hong Kong SAR

Corresponding author:
Man Ping Wang
School of Nursing
The University of Hong Kong,
21 Sassoon Road, Pokfulam
Hong Kong SAR
Tel. +852-3917-6636
E-mail:mpwang@hku.hk

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ABSTRACT

Introduction: Health information about Coronavirus Disease 2019 (COVID-19) has been circulating in social networking sites, including unproven claims that smoking and alcohol drinking could protect against COVID-19. We examined if exposure to such claims was associated with changes in tobacco and alcohol consumption.

Methods: We conducted a population-based, landline and mobile phone survey of 1501 randomly sampled adults aged 18 years or older (47.5% male) in Hong Kong in April 2020. Respondents reported if they had ever seen claims that "smoking/ alcohol drinking can protect against COVID-19" from popular social networking platforms. Current tobacco and alcohol users reported if they had increased or reduced their consumption since the outbreak. Prevalence data were weighted by sex, age and education of the general adult population.

Results: 19.0% (95% CI 16.8–21.4%) of all respondents reported having seen claims that "smoking/ alcohol drinking can protect against COVID-19" from social networking sites. Multinomial logistic regressions showed that exposure to the claims was significantly associated with increased tobacco use (OR 2.24, 95% CI 1.06–4.73) in current tobacco users (N=280) and increased alcohol use (OR 4.12, 95% CI 2.03–8.37) in current drinkers (N=722), adjusting for sex, age, education level, alcohol/ tobacco use status, home isolation, anxiety and depressive symptoms, and survey method.

Conclusions: Our results first showed that exposure to health misinformation that smoking/ alcohol drinking can protect against COVID-19 was associated with self-reported increases in tobacco and alcohol consumption in Chinese during the pandemic.

INTRODUCTION

Dissemination of health (mis)information about coronavirus disease 2019 (COVID-19) via social networking sites, including mobile instant messaging apps and social media platforms, is rapid and far-reaching. Inaccurate or unproven claims that smoking and alcohol drinking could protect against COVID-19 has been circulating online, despite the World Health Organization's warnings about the lack of evidence.[1,2] Exposure to health misinformation may influence a person's health beliefs, thereby leading to intention to change and actual change in health behaviors.[3] Nevertheless, the impact of health misinformation exposure on behaviors has remained understudied.

The smartphone penetration rate in Hong Kong is among the highest in the world (91.5% in 2019)[4], and social networking sites have become a major medium for communicating health information.[5] We examined if exposure to misinformation that smoking/ alcohol drinking can protect against COVID-19 was associated with self-reported changes in tobacco and alcohol consumptions in current users in Hong Kong.

METHODS

Since the first confirmed COVID-19 case on January 23, 2020, Hong Kong had border restrictions, social distancing measures, quarantine, and nearly universal voluntary mask-wearing but no enforced lockdown.[6] The outbreak peaked in late March with 1035 confirmed cases by April 23. We drew cross-sectional data from the Hong Kong COVID-19 Health Information Survey (CoVHInS) conducted from April 9 to 23, 2020. The design of the survey was adapted from our Family and Health Information Trend Survey (FHInTS) published elsewhere.[5,7] All respondents provided informed consent before completing the questionnaires.

Sampling methods

We randomly sampled Chinese-speaking Hong Kong residents aged 18 years or above by landline telephone (random digital dialing) and mobile phone. The landline survey used a two-stage sampling strategy. First, a list of landline telephone numbers was generated by using the Government's numbering plan for telecommunication services and randomized for telephone contacts. Second, upon successful contact with an eligible household, an eligible resident whose next birthday was closest to the interview date was invited to participate in the telephone interview. The mobile survey randomly sampled respondents from a population-representative panel of over 100,000 mobile phone users formed by a leading research agency in Hong Kong, with no second-stage sampling. We planned to recruit 1500 respondents (500 through landline, 1000 through mobile phone), which would give a margin of error of ±2.5% for prevalence estimates of 50% at a 95% confidence level.

Data collection

Respondents of the landline survey were interviewed directly via telephone by trained interviewers using a computer-assisted telephone interviewing system. Respondents of the mobile survey received a private link via text messages or e-mail to access a web-based computer-assisted personal interviewing system and self-administered the questionnaire. Cognitive interviewing was conducted with 10 persons to refine the questionnaire design. We checked a random fifth of the landline interview record to confirm the quality.

Respondents were asked if they had ever seen claims that "smoking/ alcohol drinking can protect against COVID-19" from WhatsApp/ WeChat, Facebook, Instagram, Twitter, and online forums (including Telegram). Current tobacco (including cigarette, electronic cigarette and heated tobacco products) and alcohol (including social and regular drinking) users were asked if they had changed their tobacco and alcohol consumptions since the COVID-19 outbreak, with response categorized into "no change", "reduced", and "increased". Other

information collected included sociodemographic variables, the practice of home isolation (number of days staying at home at most times in the past week), and psychological distress in the past 2 weeks assessed by the Patient Health Questionnaire-4 (PHQ-4), which gives a summary score of 0 to 16 with a higher score indicating greater anxiety and depressive symptoms.[8]

Data analyses

Prevalence or proportions were weighted by the sex, age, and education to be representative of the Hong Kong general adult population. We applied multinomial logistic regression to model self-reported increase and reduction in tobacco and alcohol consumption ("no change" as the base outcome) by exposure to the claims that "smoking/ alcohol drinking can protect against COVID-19" (yes vs no). In addition to survey methods (landline vs mobile), we adjusted for factors that might be associated with health information exposure via social networking sites and/ or changes in tobacco and alcohol consumption. These included sex, age, education,[5] home isolation, and anxiety and depressive symptoms.[9,10] Since tobacco use and alcohol drinking are often linked, tobacco and alcohol use status were also mutually adjusted. We repeated the regressions by modeling "drinking tea can protect against COVID-19" as the exposure variable, which should show no association with the outcomes (negative exposure control). Complete case analyses were used because there was no missing data. All analyses were done in Stata/MP version 15.1. A two-sided P of less than 0.05 indicates statistical significance.

RESULTS

1501 respondents completed the survey, with a response rate of 61.3% (500 of 816) for the landline survey and 61.7% (1001 of 1623) for the mobile survey. Of 1501 respondents, 282 (19.0%; 95% CI 16.8–21.4%) reported having seen claims that "smoking/ alcohol drinking

can protect against COVID-19" from social networking sites. Leading sources of exposure were WhatsApp/ WeChat (n=149) and Facebook (n=138), followed by online forums (n=64), Instagram (n=37), and Twitter (n=6; not widely used in Hong Kong). Bivariate analysis showed that exposure was associated with male sex, younger age, and higher education (all P<0.001), and current tobacco use (P=0.045) (Online Supplementary Table S1). Home isolation, PHQ-4 score, and survey method were not associated with exposure.

15.6% (48 of 280) of current tobacco users and 5.5% (42 of 722) of alcohol users reported having increased their consumptions since the outbreak. The corresponding prevalence of reduced consumptions were 19.1% (49 of 280) and 36.8% (244 of 722). Table 1 shows that exposure to the claims and longer home isolation was significantly associated with self-reported increase, but not reduction, in tobacco and alcohol consumptions. Higher PHQ-4 scores were significantly associated with both increase and reduction in tobacco and alcohol consumption.

In the sensitivity analysis, exposure to claims that "drinking tea can protect against COVID-19" (17.0%; 242 of 1501) showed no significant association with self-reported change in tobacco and alcohol consumptions (all P>0.11).

DISCUSSION

In this population-based survey of Hong Kong adults, nearly a fifth of the respondents reported having seen claims that smoking/ alcohol drinking can protect against COVID-19, and exposure to these claims was associated with self-reported increases in tobacco and alcohol use in current users. The results remained significant after adjusting for other factors that may contribute to changes in tobacco and alcohol consumption under the COVID-19 outbreak, including home isolation and mental distress.[9, 10]

The study also had some notable results. First, more men than women were exposed to such misinformation, which may reflect the male predominance in tobacco and alcohol use in Chinese cultures. The higher rate of exposure in younger and higher educated respondents can be explained by the greater use of social networking tools,[5] which facilitated dissemination of health (mis)information. Second, the proportion of reduction in alcohol drinking (36.8%) was much larger than that of increase (5.5%). This could be attributed to enforced closures of bars, pubs, and nightclubs from April 3 through the entire data collection period. Since Chinese often drink alcohol during social gatherings and dinning, the practice of social distancing might have contributed to alcohol reduction. Third, increased psychological distress was associated with both increase and reduction in tobacco use. While mental distress is a known risk factor for increased smoking,[11] it is plausible that some tobacco users reduced their consumptions out of distress induced by the fear of adverse COVID-19 outcomes. This suggests the COVID-19 outbreak could be a teachable moment for promoting smoking cessation.

Claims about smoking protecting against COVID-19 might have been facilitated by a widely publicized article hypothesizing a protective role of nicotine in COVID-19 infection,[12] wherein the lead author had previously received funding from the tobacco industry.[13] The hypothesis was based on tentative data showing an underrepresentation of smokers in hospitalized COVID-19 patients.[14] However, these data might have been misinterpreted because of misclassification of smoking status (e.g., underreporting, reverse causation) and sampling error (e.g., overrepresentation of healthcare workers). Similar claims about smoking could prevent Severe Acute Respiratory Syndrome had also been widely spread in 2003,[15] which has later been proven unfounded.[16] Growing evidence has also suggested smoking is associated with poor prognosis and deaths from COVID-19, although more evidence on the effect of smoking on COVID-19 incidence is needed.[17] Our results have highlighted the

potential of unproven claims in misguiding the public and undermining public health efforts against tobacco use and risky drinking, not to mention adding burden to the already overstrained healthcare system during the pandemic.

Study limitations included the cross-sectional design and self-reported measures. The relatively small sample precluded examination of the associations in demographic subgroups. Although we assessed exposure to health misinformation from several popular social networking sites, exposure via other outlets (e.g., traditional media) were not accessed. This might have misclassified some respondents as unexposed and biased the observed associations towards the null. Unmeasured or residual confounding could not be excluded, but the null association between the negative exposure control and outcomes provided support for the validity of the results.

What this paper adds

- Unproven health information about the coronavirus disease 2019 (COVID-19) has been circulating through online outlets, but little is known about the impact of exposure to health misinformation on behaviors.
- In a population-representative sample of Chinese adults in Hong Kong, nearly a fifth of the respondents reported having seen claims that smoking/ alcohol can protect against COVID-19 from social networking sites.
- Exposure to such misinformation was associated with self-reported increases in smoking and alcohol drinking in current users, after adjusting for sociodemographic characteristics, home isolation, and mental distress.

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Table 1. Associations of exposure to claims that "smoking/ alcohol drinking can protect against COVID-19" with changes in tobacco and alcohol drinking consumptions ("no change" as base outcome)

	Changes in consumption, unweighted n (weighted %)*			Reduced consumption, OR (95% CI)		Increased consumption, OR (95% CI)	
	No change	Reduced	Increased	Model 1†	Model 2‡	Model 1†	Model 2‡
Tobacco smoking (N=280)							
Exposure to the claims							
No	140 (77.1)	35 (75.1)	31 (66.8)	1 (Reference)	1 (Reference)	1 (Reference)	1 (Reference)
Yes	43 (22.9)	14 (24.9)	17 (33.3)	1.30 (0.63–2.69)	1.32 (0.63–2.78)	2.16 (1.04–4.49)§	2.37 (1.08–5.20)§
Home isolation (0-7 days)							
Mean ± SD	3.2 ± 1.8	3.7 ± 1.8	4.0 ± 1.7	1.19 (0.98–1.43)	1.19 (0.97–1.45)	1.19 (0.98–1.44)	1.29 (1.04–1.61)§
PHQ-4 score (0-16)							
Mean ± SD	7.0 ± 2.3	8.0 ± 2.4	8.8 ± 3.2	1.20 (1.05–1.37)¶	1.20 (1.05–1.37)¶	1.30 (1.13–1.49) ‖	1.26 (1.09–1.45)¶
Alcohol drinking (N=722)							
Exposure to the claims							
No	364 (80.9)	190 (79.7)	23 (60.1)	1 (Reference)	1 (Reference)	1 (Reference)	1 (Reference)
Yes	72 (19.1)	54 (20.3)	19 (39.9)	1.22 (0.81–1.84)	1.27 (0.84–1.94)	4.30 (2.15–8.60)‖	4.16 (2.00–8.67)‖
Home isolation (0-7 days)							
Mean ± SD	3.4 ± 1.7	3.5 ± 1.8	4.1 ± 1.9	1.04 (0.95–1.14)	1.03 (0.94–1.14)	1.26 (1.05–1.51)§	1.28 (1.05–1.57)§
PHQ-4 score (0-16)							
Mean ± SD	7.0 ± 2.3	6.8 ± 2.4	8.8 ± 3.3	0.94 (0.88–1.01)	0.94 (0.88–1.01)	1.31 (1.16–1.47) ‖	1.26 (1.10–1.44) ‖

*Weighted by sex, age, and education of the general adult population in Hong Kong

† Adjusted for survey method, sex, age, and education level.

‡ Adjusted for survey method, sex, age, education level, tobacco/ alcohol use status, and other variables in the table

§ P<0.05

¶ P<0.01

‖ P<0.001

PHQ-4, Patient Health Questionnaire-4