Exploration of coping styles in male patients with head and neck cancer: a prospective cohort study

Naohiro Sato¹, Hiroyuki Kimura¹, Yasunori Adachi², Naoki Nishio³, Masahiko Ando⁴, Tatsuya Tokura¹, Wataru Nagashima³, Shinichi Kishi¹, Aya Yamauchi¹, Keizo Yoshida⁵, Mariko Hiramatsu³, Yasushi Fujimoto³, and Norio Ozaki¹

¹Department of Psychiatry, Nagoya University Graduate School of Medicine, Nagoya, Japan
²Department of Palliative Care, Anjo Kosei Hospital, Anjo, Japan
³Department of Otorhinolaryngology, Nagoya University Graduate School of Medicine, Nagoya, Japan
⁴Center for Advanced Medicine and Clinical Research, Nagoya University Hospital, Nagoya, Japan
⁵Department of Psychopathology & Psychotherapy / Center for Student Counseling, Nagoya University Graduate School of Medicine, Nagoya, Japan
⁶Health Care Promotion Division, DENSO Corporation, Kariya, Japan

ABSTRACT

Majority of head and neck cancer (HNC) patients are male, and more than 85% of patients with HNC have the habit of smoking and drinking. Due to the specific demographic characteristics, HNC patients are anticipated to have specific coping styles, affecting psychological distress, survival, and quality of life. We explored the subscales of the Mental Adjustment to Cancer (MAC) Scale in male patients with HNC, and then examined the correlation between revised subscales of the MAC scale and anxiety/depression. Participants were 150 male inpatients with HNC, and their demographic and medical data were obtained. Coping style was assessed by MAC scale. Anxiety and depression were assessed using the Hospital Anxiety and Depression Scale. Out of 40 items in the original MAC scale, 19 items were excluded by factor analysis, and the remaining 21 items were divided into three factors: Negative Adjustment, Positive Adjustment, and Abandonment. Negative and Positive Adjustments were similar to the copings of mixed gender patients with heterogeneous cancers, and Abandonment was a new subscale specific to male patients with HNC. This subscale had a weak positive correlation with anxiety and depression. Male HNC patients revealed a specific coping style of Abandonment, related with psychological distress. We believe that an understanding of the Abandonment coping style revealed in our study will improve the psychological support offered to male patients with HNC.

Keywords: head and neck cancer, coping, anxiety, depression, oncology

Abbreviation:
HNC: head and neck cancer
MAC: the Mental Adjustment to Cancer
HAD: the Hospital Anxiety and Depression

This is an Open Access article distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License. To view the details of this license, please visit (http://creativecommons.org/licenses/by-nc-nd/4.0/).
INTRODUCTION

Head and neck cancer (HNC) is a broad term that includes epithelial malignancies arising in the paranasal, nasal, or oral cavities, or the pharynx or larynx. A worldwide epidemiological study found that nearly three-quarters of HNC patients were male. More than 85% of patients with HNC have a history of cigarette smoking and drinking alcohol (previous and current), suggesting that HNC is related to lifestyle factors. Regarding the penetration rate of cigarette smoking and drinking alcohol, male was higher than female. Similar results were obtained from Japanese public investigation. According to the general population, the previous large-scale studies have demonstrated the gender differences in coping style. Recentry, this results was match the same in japanese patients with lung cancer.

The coping style of patients with HNC has been gained attention and has been shown to vary according to the patient’s treatment phase and level of psychological distress. Arastad et al reported that level of distress predicts subsequent survival in successfully treated HNC patients. Furthermore, moderate - to - large associations between disengagement coping mechanisms (eg, avoidance) and psychological distress were observed the patients with HNC.

In a recent systematic review, psychological distress has great effect on depression and anxiety. The prevalence of depression is estimated to be 46% in HNC patients, and the suicide rate is higher than that in patients with other types of cancer. Avoidance or negative coping is associated with depression among HNC patients and the Coping style of HNC patients is one of the risk factors related to depression. Henry et al reported that the coping with the diagnosis by alcohol/drugs was a predictor of 1-year period prevalence of suicidal ideation in HNC. Through the background above, the head and neck cancer patients should cope with these distress appropriately. However, the higher risk of suicide in male compared with female HNC patients suggests that males do not cope with HNC as well as females. We needed to consider the investigation of coping style in male patients with HNC related to the depression and anxiety.

The Mental Adjustment to Cancer (MAC) scale is widely used to assess coping styles in cancer patients. The MAC scale consists of 40 items in five subscales: Fighting Spirit (FS), Hopeless/Helplessness (HH), Anxious Preoccupation (AP), Fatalistic (F), and Avoidance (A). The HH, AP, and F subscales are associated with anxiety and depression. Attempts to replicate the five MAC subscales in heterogeneous populations have yielded inconsistent results. Watson and Homewood re-evaluated the original subscale structure in a large heterogeneous sample of cancer patients and proposed a structure: the Summary Positive Adjustment Scale and Summary Negative Adjustment Scale. However, it is not clear whether these summary scales are useful for patients with HNC because of their specific demographic characteristics and psychosocial circumstances. To prevent perseverative negative thinking with subsequent poor medical outcomes, we will re-examine the psychometric properties of the MAC scale in male patients with HNC.

In our study, we reassessed the original MAC subscales in male patients with HNC and examined the correlation between our revised MAC subscales and levels of anxiety and depression.

METHODS

Patients

We established a liaison psychiatry medical team for HNC patients in Nagoya University Hospital in 2005. Patients routinely received psychiatric liaison intervention by our liaison team, consist of otolaryngologists, dental surgeons, psychiatrists, psychologists, nurses, occupational therapists and social workers with monthly interprofessional conferences. Psychiatrists preoperatively
assessed the mental condition of the patients. If necessary, performed psychiatric intervention for patients with treated psychiatric disorders based on the evidence based guidelines in Japan.

Patients were enrolled between April 2006 and August 2012 at Nagoya University Hospital in Japan. We included the patients with head and neck cancer, who planned to undergo the radical surgery and need the reconstructive surgery for head and neck carcinoma. We excluded patients with cognitive disorders, schizophrenia, or a history of other psychotic disorders according to the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision (DSM-IV-TR).31

Variables and measures

Demographic and medical data were collected during the interview and obtained from patient medical records at baseline. Patients were classified as non-smoker, previous smoker, or current smoker. Non-smoker was defined as never having smoked. Previous smoker was defined as having quit smoking more than a year before the date of the psychiatrist interview. Current smoker was defined as smoking at the time of the psychiatrist interview or as having quit smoking within a year before the date of the interview. Patients were classified as non-drinker, previous drinker, or current drinker in the same manner.

Coping style was assessed using the Japanese version of the MAC scale.32 The MAC scale is a 40-item self-rating questionnaire with a four-point Likert scale ranging from 1 (‘definitely does not apply to me’) to 4 (‘definitely applies to me’). The five original subscales are FS (16 items), HH (6 items), AP (9 items), F (8 items), and A (1 item).33,34 The proposed general subscales are the Summary Positive Adjustment Scale (17 items) and Summary Negative Adjustment Scale (16 items).30

Anxiety and depression levels were assessed using the Japanese version of the Hospital Anxiety and Depression (HAD) scale,35 an effective screening tool widely used in psycho-oncology clinical and research settings. The questionnaire contains 14 items (7 items each for the depression and anxiety subscales) rated on a four-point Likert scale ranging from 0 to 3. Subscale scores range from 0 (no distress) to 21 (maximum distress), and the total score ranges from 0 to 42.36

As is the previous studies,21,37 the patients were assessed at four time-points by psychiatrists and psychologists. The first evaluation (Time 0: T0) was performed shortly after the interview with the psychiatrist, and the second (Time 1: T1), third (Time 2: T2), and fourth (Time 3: T3) evaluations were performed at 3, 6, and 12 months, respectively, after the first evaluation. At T0, we assessed coping style and the levels of anxiety and depression. At T1, T2 and T3, we assessed the levels of anxiety and depression.

Statistical analyses Bartlett’s test of sphericity and the Kaiser-Meyer-Olkin measure of sampling adequacy were used. We performed an exploratory principal axis factor analysis with oblique rotation because it permits correlations among factors.38 We identified the number of meaningful factors based on the scree plot, parallel analysis, and factor interpretability. Items were retained if loadings were equal to or greater than 0.45 and the value of the communalities was higher than 0.25. Reliability coefficients were calculated using Cronbach’s alpha for each extracted factor.

Correlation coefficients were calculated between each extracted MAC subscale, which was assessed at T0, and each HAD subscale, which was assessed at T0–T4. P-values <0.05 were deemed to indicate statistical significance. Statistical tests were conducted using the Statistical Package for Social Sciences version 19.0 (SPSS Inc., Chicago, IL, USA) and R version 3.2.4.

The protocol of this study was approved by the Ethics Review Committee of Nagoya University Graduate School of Medicine (approval no. 2007-0543: Nagoya University). This study was conducted in accordance with the Helsinki Declaration. Written informed consent was obtained from each subject by psychiatrists before the start of the study.
RESULTS

Patient characteristics

A total of 257 HNC patients planned to undergo the radical surgery and need the reconstructive surgery for head and neck carcinoma. Of the 212 HNC patients (82.5%) who agreed to participate in this study, 150 patients (58.4%) completed the MAC and HADS at the first evaluation (T0). Patient demographic characteristics and medical information are shown in Table 1. The mean age of the patients was 62.1 years (SD 11.2, range 20–82 years). Eighty percent of the participants were married, 81% of the participants had at least 10 years of education and about 43% were not working (retired or unemployed). In total, 81% of the patients were previous or current smokers and 78% were previous or current drinkers. The majority of patients had advanced cancer of the hypopharynx, oral cavity, or other areas. Surgical treatment was planned for 97% of the patients. At T1, 45 patients were excluded because of canceled appointments. At T2, 54 patients were excluded due to cancelled appointment (N = 48), transfer to another hospital (N = 1), or death (N = 5). At T3, 49 patients were excluded due to cancelled appointment (N = 32), transfer to another hospital (N = 5), or death (N = 12). Thus, the final analysis included 105, 96, and 101 patients at T1, T2 and T3, respectively, with 58 patients evaluated at all time points.

Factor analysis

The Kaiser-Meyer-Olkin statistic was 0.77 and Bartlett’s test was significant ($\chi^2 = 2357.8$, df = 780; p < 0.001). The principal component analysis identified 12 factors with eigenvalues greater than one, which accumulatively accounted for 67.01% of the total variance. We identified a three-factor solution. The scree plot showed a steep drop from factor two to factor three, supporting a two-factor solution. Parallel analysis suggested a four-factor solution. Based on the results of these analyses and the interpretation of the factor solutions, we determined that a three-factor solution was the most appropriate. Therefore, the factor analysis was performed using the oblimin rotation to extract three factors. Based on our exclusion criteria, 16 items were excluded (Q1, Q3, Q4, Q5, Q8, Q12, Q14, Q15, Q18, Q19, Q24, Q28, Q29, Q34, Q35, Q38).

To obtain the best model, we performed a second factor analysis using the remaining 24 items. Three items (Q9, Q13, Q20) were excluded because they explained less variance than the others. Finally, a third factor analysis was performed using the remaining 21 items (Table 2). The final model included 21 items in three factors accounting for 48.71% of the variance. The factors were named “Negative Adjustment (NA)”, “Positive Adjustment (PA)”, and “Abandonment” according to Watson and Homewood22 and the content of the items. Cronbach’s alpha values for NA, PA, and Abandonment were 0.85, 0.81, and 0.74, respectively.

Correlation

Table 3 shows the correlation coefficients between the revised MAC subscale scores and the HAD subscale scores at each time-point. NA was positively correlated with the HAD anxiety and depression subscales at all time points and PA was negatively correlated with the HAD anxiety and depression subscales at T0. Abandonment was positively correlated with the HAD anxiety subscale at T0 and T3 and positively correlated with the depression subscale at all time points.
### Table 1  Patient demographic characteristics and medical information (n = 150)

| Demographic/medical characteristic | Frequency (%) |
|-----------------------------------|---------------|
| **Age**                           |               |
| Mean                              | 62.1 (SD=11.2) |
| Range                             | 20–82         |
| **Marital status**                |               |
| Married/cohabiting                | 120 (80)      |
| Divorced/separated                | 4 (3)         |
| Single                            | 20 (13)       |
| Widowed                           | 6 (4)         |
| **Education**                     |               |
| <10                               | 29 (19)       |
| ≥10                               | 121 (81)      |
| **Employment status**             |               |
| Retired                           | 56 (37)       |
| Unemployed                        | 9 (6)         |
| Full- or part-time                | 65 (43)       |
| Self employed                     | 17 (11)       |
| Student                           | 3 (2)         |
| **Smoking**                       |               |
| Never                             | 16 (11)       |
| Previous                          | 54 (36)       |
| Current                           | 67 (45)       |
| Unknown                           | 13 (9)        |
| **Drinking**                      |               |
| Never                             | 19 (13)       |
| Previous                          | 17 (11)       |
| Current                           | 100 (67)      |
| Unknown                           | 14 (9)        |
| **Stage**                         |               |
| 1                                 | 3 (2)         |
| 2                                 | 11 (7)        |
| 3                                 | 23 (15)       |
| 4                                 | 112 (75)      |
| none (benign tumor)               | 1 (0.6)       |
| **Site of cancer**                |               |
| Oral cavity                       | 22 (15)       |
| Nasal/Paranasal cavity            | 28 (19)       |
| Oropharynx                        | 19 (13)       |
| Hypopharynx                       | 52 (35)       |
| Larynx                            | 16 (11)       |
| Other                             | 13 (9)        |
| **Treatment**                     |               |
| Surgery only                      | 35 (23)       |
| Radiotherapy only                 | 2 (1)         |
| Surgery and radiation             | 26 (17)       |
| Surgery and chemotherapy          | 33 (22)       |
| Radiotherapy and chemotherapy     | 2 (1)         |
| Surgery, chemotherapy and Radiotherapy | 52 (35)   |
Table 2  Factor loading estimates for the exploratory factor analysis of the MAC subscales.

| Items | Original subscales | Original items | FACTOR1 | FACTOR2 | FACTOR3 |
|-------|--------------------|----------------|---------|---------|---------|
| Q22   | AP                 | Anxiety        | 0.86    | -0.03   | -0.14   |
| Q36   | HH                 | At a loss      | 0.79    | -0.07   | 0.07    |
| Q37   | AP                 | Angry          | 0.75    | 0.00    | -0.07   |
| Q23   | HH                 | Not hopeful    | 0.71    | -0.07   | 0.11    |
| Q21   | AP                 | Difficult believing | 0.66    | 0.14    | -0.01   |
| Q25   | HH                 | Giving up      | 0.52    | -0.05   | 0.15    |
| Q33   | F                  | Avoid information | 0.46    | 0.09    | 0.06    |
| Q2    | HH                 | Can’t cheer    | 0.45    | -0.14   | 0.14    |
| FACTOR2 : Positive Adjustment |
| Q31   | FS                 | Try positive attitude | -0.28   | 0.75    | 0.16    |
| Q40   | FS                 | Fight illness  | 0.00    | 0.65    | 0.00    |
| Q6    | FS                 | Get better     | -0.07   | 0.65    | -0.04   |
| Q26   | FS                 | Humour         | -0.05   | 0.57    | 0.08    |
| Q10   | AP                 | Exercise       | -0.04   | 0.55    | -0.12   |
| Q39   | FS                 | Count blessings | 0.10    | 0.52    | 0.03    |
| Q27   | FS                 | Others worry   | -0.05   | 0.51    | -0.01   |
| Q32   | FS                 | Keep busy      | 0.23    | 0.50    | 0.21    |
| Q11   | FS                 | Life precious  | 0.22    | 0.50    | -0.13   |
| Q16   | FS                 | Mind makes difference | 0.01    | 0.49    | -0.16   |
| FACTOR3 : Abandonment |
| Q30   | F                  | Can’t control  | -0.03   | 0.06    | 0.92    |
| Q7    | F                  | Nothing makes a difference | 0.05    | -0.02   | 0.61    |
| Q17   | HH                 | Nothing to help | 0.15    | -0.09   | 0.60    |
| % Explained |        |                | 22.95   | 40.98   | 48.71   |
| Cronbach’s alpha |            |                | 0.853   | 0.809   | 0.741   |

Table 3  Correlation coefficients between the revised MAC subscale scores and the HAD anxiety and depression scores at the four time points (T0, T1, T2, and T3).

| Time0 HAD scale (N=150) | Time1 HAD scale (N=105) | Time2 HAD scale (N=96) | Time3 HAD scale (N=101) |
|-------------------------|-------------------------|------------------------|-------------------------|
| Anxiety                 | Depression              | Anxiety                | Depression              |
| Negative Adjustment     | .576**                  | .564**                 | .262**                  | .337**                  |
| Positive Adjustment     | -.222**                 | -.328**                | -.050                   | -.181                   |
| Abandonment             | .170*                   | .278**                 | .023                    | .241*                   |

*p<.05  ** p<.01
DISCUSSION

We reassessed the MAC scale in male patients with HNC. We excluded 19 of the original 40 items, and the remaining 21 items were incorporated into three subscales: NA, PA, and Abandonment.

NA included four items (Q2, Q23, Q25, Q36) of the original HH, three items (Q21, Q22, Q37) of the original AP, and one item (Q33) of the original F subscale. PA included nine items (Q6, Q11, Q16, Q26, Q27, Q31, Q32, Q39, Q40) of the original FS and one item (Q10) of the original AP subscale. Abandonment included one item (Q17) from the original HH and two items (Q7, Q30) from the original F subscale. In relation to the revised two-factor structure proposed by Watson and Homewood,30 seven of the eight items in the NA factor (Q2, Q21, Q22, Q23, Q25, Q37, Q36) were common to the Summary Negative Adjustment scale (Q33 was excluded), indicating that NA was similar to the Summary Negative Adjustment scale. Nine of the 10 items in the PA subscale (Q6, Q11, Q16, Q26, Q27, Q31, Q32, Q39, Q40) were common to those in the Summary Positive Adjustment scale (Q10 was excluded), indicating that these two were also similar.

Abandonment could be extracted independently as a subscale specific to male patients with HNC. Abandonment included one item from the original HH (Q17: I feel there is nothing I can do to help myself) and two items from the original F subscale (Q7: I feel that nothing I can do will make a difference, Q30: I feel that I can’t control what is happening to me); all three were included in the Summary Negative Adjustment scale. These three items have not been extracted in previous exploratory factor analyses performed in heterogeneous samples of cancer patients.26-29 In a study of female patients with breast cancer, Osborne et al29 revised the original F subscale into two factors: Fatalism-revised and Loss of Control. Loss of Control comprised four items (Q7, Q24, Q30, Q33), two of which (Q7, Q30) are included in our Abandonment subscale. Osborne et al29 defined Loss of Control as a loss or lack of control over the cancer and little motivation for pursuing cancer treatment or making future plans. Breast cancer and HNC patients may experience similar psychological distress because both conditions involve body disfigurement.

Our participants were male, 81% were previous or current smokers, 78% were previous or current drinkers, and 71% were advanced-stage (stage IV) patients. These demographic characteristics may contribute to the Abandonment coping style. However, other studies have found contradictory results. Vidhubala et al39 found that compared with females, male patients with HNC tended to show problem-oriented coping that led to better adjustment. Moreover, Aarstad et al40 found no correlation between avoidance coping (denial, behavioral disengagement, mental disengagement) and smoking/drinking behaviors in mixed-sex patients with HNC. Ichikura et al41 reported that HNC patients often showed a dependent - coping style after completion of treatment. The disparity between our findings and those of Vidhubala et al,39 Aarstad et al40 and Ichikura et al41 may be explained by differences in cancer stages. The previous studies included patients at various stages of HNC, whereas our subjects were patients with advanced-stage HNC. Sherman et al10 reported that patients with advanced-stage HNC had poor coping responses (denial, behavioral disengagement, suppression of competing activities). Thus, cancer stage, sex, and drinking and smoking status may contribute to the likelihood that patients adopt the Abandonment coping style.

If Abandonment coping style of male patients with HNC were extracted, the Abandonment subscale was positively correlated with anxiety and depression, although the correlation coefficient was relatively small. Kugaya et al42 found an association between the original HH subscale and depressed mood. Hassanein et al43 investigated psychological outcome and coping style in mixed-sex patients with oral cancer and found that the original HH, AP, and F subscales were
correlated with anxiety and depression. The Abandonment factor included one of the six items in the original HH and two of the eight items in the F subscale; this derivation may partly explain the weak correlation between Abandonment and anxiety/depression.

Our study has several limitations. Despite the exploratory nature of the study, we only investigated the male patients and our sample size was too small to conduct meaningful statistical tests. The cancellation rates were extremely high—nearly 30% at each evaluation point. Further study including female with a larger sample size is necessary to draw definitive conclusions. Furthermore, our findings are not generalizable to all patients with HNC because most of our patients were admitted to the Nagoya University Hospital Otorhinolaryngology Department for surgical treatment of advanced-stage cancer. However, we believe our findings have significant clinical implications for patients undergoing surgery for advanced-stage cancer.

CONCLUSION

We reassessed the MAC subscales in male patients with HNC and examined the correlations between these scores and levels of anxiety and depression. The factor analysis excluded 19 of the original 40 items on the MAC scale, and the remaining 21 items were re-grouped into three coping styles: Negative Adjustment, Positive Adjustment, and Abandonment. The Negative and Positive Adjustment styles were typical of mixed-sex patients with heterogeneous cancers, while Abandonment was specific to male patients with HNC and showed a weak positive correlation with anxiety and depression. We found that the Abandonment coping style was specific to male patients with HNC in response to psychological distress.

ACKNOWLEDGMENTS

This study was fully supported by a governmental grant of a Grant-in-Aid for Scientific Research (C, no. 16K10249) from the Japanese Ministry of Education, Culture, Sports, Science and Technology and the Japanese Society for the Promotion of Science.

CONFLICT OF INTEREST

The authors declare that there are no conflicts of interest.

REFERENCES

1. Ferlay J, Soerjomataram I, Dikshit R, et al. Cancer incidence and mortality worldwide: sources, methods and major patterns in GLOBOCAN 2012. Int J Cancer. 2015;136(5):E359–386.
2. Dal Maso L, Torelli N, Biancotto E, et al. Combined effect of tobacco smoking and alcohol drinking in the risk of head and neck cancers: a re-analysis of case-control studies using bi-dimensional spline models. Eur J Epidemiol. 2016;31(4):385–393.
3. (PND) WPoND. Tobacco use prevalence. WHO report on the global tobacco epidemic 2017 2018; http://www.who.int/tobacco/global_report/2017/en/. Accessed October 4, 2018.
4. Health tMoSAUMitDoM. Status report without country profiles. Global status report on alcohol and health 2014. http://www.who.int/substance_abuse/publications/global_alcohol_report/en/. Accessed October 4, 2018.
5. Suga H. Outline of the National Health and Nutrition Survey (NHNS) Japan. Japan National Health and Nutrition Survey 2012.
6. Kelly MM, Tyrka AR, Price LH, Carpenter LL. Sex differences in the use of coping strategies: predictors
Coping styles in male patients with head and neck cancer

of anxiety and depressive symptoms. Depress Anxiety. 2008;25(10):839–846.

7. Al-Bahrani M, Alhdafi S, Alkharusi H, Kazem A, Alzubiadi A. Age and gender differences in coping style across various problems: Omani adolescents’ perspective. J Adolesc. 2013;36(2):303–309.

8. Matud MP, Bethencourt JM, Ibanez I. Gender differences in psychological distress in Spain. Int J Soc Psychiatry. 2015;61(6):560–568.

9. Shimizu K, Nakaya N, Saiito-Nakaya K, et al. Personality traits and coping styles explain anxiety in lung cancer patients to a greater extent than other factors. Jpn J Clin Oncol. 2015;45(5):456–463.

10. Sherman AC, Simонтон S, Adams DC, Vural E, Hanna E. Coping with head and neck cancer during different phases of treatment. Head Neck. 2000;22(8):787–793.

11. List MA, Lee Rutherford J, Stracks J, Haraf D, Kies MS, Vokes EE. An exploration of the pretreatment coping strategies of patients with carcinoma of the head and neck. Cancer. 2002;95(1):98–104.

12. Aarstad AK, Beisland E, Osthuss AA, Aarstad HJ. Distress, quality of life, neuroticism and psychological coping are related in head and neck cancer patients during follow-up. Acta Oncol. 2011;50(3):390–398.

13. Elani HW, Allison PJ. Coping and psychological distress among head and neck cancer patients. Support Care Cancer. 2011;19(11):1735–1741.

14. Aarstad HJ, Osthuss AA, Olofsson J, Aarstad AK. Level of distress predicts subsequent survival in successfully treated head and neck cancer patients: a prospective cohort study. Acta Otolaryngol. 2014;134(2):211–219.

15. Morris N, Moghaddam N, Tickle A, Biswas S. The relationship between coping style and psychological distress in people with head and neck cancer: A systematic review. Psychooncology. 2018;27(3):734–747.

16. Trick L, Watkins E, Windeatt S, Dickens C. The association of perseverative negative thinking with depression, anxiety and emotional distress in people with long term conditions: a systematic review. J Psychosom Res. 2016;91:89–101.

17. Duffy SA, Ronis DL, Valenstein M, et al. Depressive symptoms, smoking, drinking, and quality of life among head and neck cancer patients. Psychosomatics. 2007;48(2):142–148.

18. Misono S, Weiss NS, Fann JR, Redman M, Yueh B. Incidence of suicide in persons with cancer. J Clin Oncol. 2004;22(20):4209–4216.

19. Horney DJ, Smith HE, McGurk M, et al. Associations between quality of life, coping styles, optimism, and anxiety and depression in pretreatment patients with head and neck cancer. Head Neck. 2011;33(1):65–71.

20. Henry M, Rosberger Z, Bertrand L, et al. Prevalence and risk factors of suicidal ideation among patients with head and neck cancer: longitudinal study. Otolaryngol Head Neck Surg. 2018;159(5):843–852.

21. Kam D, Salib A, Gorgy G, et al. Incidence of suicide in patients with head and neck cancer. JAMA Otolaryngol Head Neck Surg. 2015;141(12):1075–1081.

22. Watson M, Haviland JS, Greer S, Davidson J, Bliss JM. Influence of psychological response on survival in breast cancer: a population-based cohort study. Lancet. 1999;354(9187):1331–1336.

23. Schnoll RA, Harlow LL, Stolbach LL, Brandt U. A structural model of the relationships among stage of disease, age, coping, and psychological adjustment in women with breast cancer. Psychooncology. 1998;7(2):69–77.

24. Akechi T, Okuyama T, Imoto S, Yamawaki S, Uchitomi Y. Biomedical and psychosocial determinants of psychiatric morbidity among postoperative ambulatory breast cancer patients. Breast Cancer Res Treat. 2001;65(3):195–202.

25. Schwartz CE, Daltroy LH, Brandt U, Friedman R, Stolbach L. A psychometric analysis of the Mental Adjustment to Cancer scale. Psychol Med. 1992;22(1):203–210.

26. Nordin K, Berglund G, Terje I, Glimelius B. The Mental Adjustment to Cancer scale–a psychometric analysis and the concept of coping. Psychooncology. 1999;8(3):250–259.

27. Cayrou S, Dickes P, Gauvain-Piquard A, Roge B. The Mental Adjustment to Cancer (MAC) scale: French replication and assessment of positive and negative adjustment dimensions. Psychooncology. 2003;12(1):8–23.

28. Mystakidou K, Watson M, Tsilika E, et al. Psychometric analyses of the Mental Adjustment to Cancer (MAC) scale in a Greek palliative care unit. Psychooncology. 2005;14(1):16–24.

29. Watson M, Homewood J. Mental Adjustment to Cancer Scale: psychometric properties in a large cancer cohort. Psychooncology. 2008;17(11):1146–1151.

30. American Psychiatric Association. Diagnostic and statistical manual of mental disorders. 4th ed. Text Revision (DSM -IV-TR). Washington DC: Amer Psychiatric Association; 2000.

31. Akechi T, Fukue-Saeki M, Kagaya A, et al. Psychometric properties of the Japanese version of the Mental Adjustment to Cancer (MAC) scale. Psychooncology. 2000;9(5):395–401.

32. Watson M, Greer S, Young J, Inayat Q, Burgess C, Robertson B. Development of a questionnaire measure...
of adjustment to cancer: the MAC scale. *Psychol Med.* 1988;18(1):203–209.
34. Greer S, Moorey S, Watson M. Patients' adjustment to cancer: the Mental Adjustment to Cancer (MAC) scale vs clinical ratings. *J Psychosom Res.* 1989;33(3):373–377.
35. Kugaya A, Akechi T, Okuyama T, Okamura H, Uchitomi Y. Screening for psychological distress in Japanese cancer patients. *Jpn J Clin Oncol.* 1998;28(5):333–338.
36. Zigmond AS, Snaith RP. The hospital anxiety and depression scale. *Acta Psychiatr Scand.* 1983;67(6):361–370.
37. Adachi Y, Kimura H, Sato N, et al. Preoperative level of depression is a predictor of postoperative levels of depression in patients with head and neck cancer. *Jpn J Clin Oncol.* 2014;44(4):311–317.
38. Fabrigar LR, Wegener DT, MacCallum RC, Strahan EJ. Evaluating the use of exploratory factor analysis in psychological research. *Psychol Methods.* 1999;4(3):272–299.
39. Vidhubala E, Latha, Ravikannan R, Mani CS, Karthikesh M. Coping preferences of head and neck cancer patients - Indian context. *Indian J Cancer.* 2006;43(1):6–11.
40. Aarstad AK, Aarstad HJ, Olofsson J. Quality of life, drinking to cope, alcohol consumption and smoking in successfully treated HNSCC patients. *Acta Otolaryngol.* 2007;127(10):1091–1098.
41. Ichikura K, Yamashita A, Sugimoto T, Kishimoto S, Matsushima E. Patterns of stress coping and depression among patients with head and neck cancer: a Japanese cross-sectional study. *Psychooncology.* 2018;27(2):556–562.
42. Kugaya A, Akechi T, Okamura H, Mikami I, Uchitomi Y. Correlates of depressed mood in ambulatory head and neck cancer patients. *Psychooncology.* 1999;8(6):494–499.
43. Hassanein KA, Musgrove BT, Bradbury E. Psychological outcome of patients following treatment of oral cancer and its relation with functional status and coping mechanisms. *J Craniomaxillofac Surg.* 2005;33(6):404–409.