

## REVIEW ARTICLE

# Oral Cancer and Physical Activity

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## ABSTRACT

This review examines the relationship between physical activity and oral cancer along the cancer continuum. There exists a large body of epidemiologic evidence that concludes those who participate in higher levels of physical activity have a reduced likelihood of developing various cancers, including oral cancer, compared with those who engage in lower levels of physical activity. Despite this observational evidence, the causal pathway underlying the association between participation in physical activity and oral cancer risk reduction has to be studied further in detail. Exercise that is optimal is needed for primary cancer prevention or symptom control during and after cancer treatment.

**Keywords:** Cancer, Exercise, Oral cancer, Physical activity.

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## INTRODUCTION

Cancer is the leading cause of death in high-income countries and the second leading cause of death in low- and middle-income countries. Oral cancer is a significant global health problem, accounting for over 600,000 new cancers diagnosed every year.<sup>1</sup> It includes the tumors of the oral cavity, pharynx, and larynx.<sup>2</sup> Alcohol drinking and tobacco use have been consistently associated with increased risk of oral cancer and these two variables account for 75% of oral cancer cases.<sup>3</sup> Few other modifiable lifestyle factors have been identified that may affect this highly fatal oral cancer.<sup>2,4</sup> Increasing evidence suggests that physical activity plays an important role in the prevention of cancer.<sup>5</sup> Physical activity may influence oral carcinogenesis specifically because physical activity

modulates specific mucosal immune parameters, such as salivary immunoglobulin A (IgA),<sup>6-9</sup> and saliva composition has been linked to oral cancer risk due to persistent saliva exposure of the epithelial mucosa of the oral cavity, pharynx, and larynx.<sup>10</sup> Despite the global significance of oral cancer and the possibility of a preventive physical activity mechanism, little attention has been directed toward exploring the association between physical activity and oral cancer.

## PHYSICAL ACTIVITY

Physical activity is any movement using skeletal muscles.<sup>11</sup> Physical activity can be categorized into four major subgroups. These subgroups include occupational (activity done at work), household (activity done at home), transport (activity done to commute), and recreational or leisure time (activity done for enjoyment and/or pleasure).<sup>12</sup> Physical activity can also be of varying intensities, including light, moderate, and vigorous intensity.<sup>13</sup> Examples of activities with light, moderate, and vigorous intensities include housework, brisk walking, and running respectively.<sup>2</sup>

## MEASUREMENT OF PHYSICAL ACTIVITY

The most common method of ascertainment of physical activity is through the use of self-report measures. The popular method of subjective physical activity estimation is with the use of physical activity questionnaires.<sup>14</sup> There are over two dozen physical activity questionnaires that demonstrate validity and reliability. For a compendium of over 100 physical activity questionnaires, we refer the reader to the National Cancer Institute physical activity questionnaire website.<sup>15</sup>

## ORAL CANCER AND PHYSICAL ACTIVITY

According to Sporn,<sup>16</sup> in contemporary medicine more focus is devoted to curing cancer in advanced stages rather than to the primary prevention of cancer. Participation in physical activity has emerged as a potent rehabilitative modality for cancer survivors in the past 20 years.<sup>17</sup> Physical activity has numerous documented health benefits among cancer survivors, including improved disease-free survival, muscular strength, aerobic capacity, and quality of life. The findings of the research have suggested that physical activity is unlikely to play an important role in the development of oral

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cancer. The lack of a statistically significant association between physical activity and total head and neck cancer and its subtypes was consistent across strata of major covariates. In particular, tobacco smoking and alcohol use did not appear to modify results.<sup>18</sup> Although the risk estimates according to the study linked physical activity to oral cancer were in the inverse direction, the overall interpretation of a largely null association was consistent with other available studies on the topic.<sup>19-21</sup> One retrospective cohort study (n = 92 cases) from Denmark<sup>19</sup> compared physically active mail carriers with the general population and reported standardized incidence ratios of 0.91, 1.08, 1.16, 0.97, and 1.31 for individual cancers of the larynx, pharynx, mouth, lip, and tongue respectively, none of which were statistically significant. Similarly, one case-control study of laryngeal cancer (n = 779 cases) from Turkey<sup>20</sup> [odds ratio (OR) = 1.20; 95% confidence interval (CI) = 0.90–1.60] and one case-control study of laryngeal cancer (n = 285 cases) and buccal cavity cancer (n = 499 cases) from the US<sup>21</sup> observed no statistically significant association with physical activity (OR = 0.5; 95% CI = 0.3–1.0 and OR = 1.1; 95% CI = 0.8–1.7 respectively). Despite the lack of an association with head and neck cancer observed in few studies, remarkable relation is observed between physical activity and oral cancer. When comparing association between physical activity and oral cancer, several possible alternative explanations suggest that greater physical activity was associated with reduced risk of total mortality and death due to oral cancer in a cohort.<sup>22</sup> A study also suggests that some occupations are associated with high activity levels but low socioeconomic status, a potential risk factor for oral cancer.<sup>23</sup> Strict control for tobacco and alcohol as well as for other potential risk factors for oral cancer is required along with physical activity. In theory, physical activity has the potential to influence oral carcinogenesis through its effects on immune function. The impact of physical activity on immunomodulation varies according to the level of exercise. As compared with sitting, low-intensity physical activity, such as walking increases circulating levels of immune parameters, including blood counts for neutrophils, lymphocytes, monocytes, and natural killer cells.<sup>24</sup> Moderate levels of exercise also enhance mucosal immune parameters, such as salivary IgA.<sup>25-27</sup> In contrast, vigorous levels of exercise decrease T and B cells<sup>28</sup> and transiently suppress natural killer cell cytotoxicity and salivary IgA.<sup>29</sup>

## CONCLUSION

The existence of a plausible biological mechanism, physical activity, is most likely to substantially impact on total oral cancer risk. The limited body of currently existing data on this topic and the relation of physical activity to

oral cancer deserve continued attention in future epidemiologic research.

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