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Oesophageal cancer in South Africa: A scoping review

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Background: Oesophageal cancer is an aggressive cancer that is endemic in certain parts of South Africa where it is the second commonest cause of cancer-related deaths. Yet, there is a paucity of research on the topic from the area.

Aim: This article aimed to assess the body of literature on clinical and epidemiological research on oesophageal cancer from South Africa and identify key research gaps.

Methods: We conducted a scoping review of research on oesophageal cancer in South Africa. We performed a search of databases as well as manual searches after cross-referencing from selected articles. We selected all appropriate articles published up to the end of 2020 and excluded genetic and laboratory-based studies without clinical components.

Results: We identified 81 articles that were published from 1957 to 2020. There was a significant decrease in the number of publications after the year 2000 and studies on the surgical management are non-existent after 2000. We found inconsistencies in the data regarding the incidence of oesophageal cancer in South Africa. Late presentation appears to be a huge factor in South Africa resulting in a poor prognosis. The largest research gaps included studies on incidence, curative management, follow-up after treatment and screening.

Conclusion: There needs to be a strong drive towards research on oesophageal cancer in order to first establish the burden of disease in South Africa and thereafter investigate ways to diagnose the disease and institute appropriate management earlier.

Keywords: oesophagus; cancer, scoping review, clinical research, South Africa.

Introduction

Worldwide, oesophageal cancer is the seventh commonest cancer and the sixth leading cause of cancer-related deaths. The two most commonest histological subtypes are squamous cell carcinoma and adenocarcinoma.[1,2] In South Africa, squamous cell carcinoma is the predominant subtype making up more than 95% of cases.[3] Geographically, South Africa falls within the African oesophageal cancer corridor, which extends from Ethiopia to South Africa and is comprised of countries considered to have a high incidence of oesophageal cancer.[4]

Despite the high prevalence, there is a paucity of research from South Africa and the amount of research is declining over time.[5] This has resulted in lack of information on basic knowledge like the burden of disease, possible aetiological risk factors and current treatment protocols in South Africa.

This scoping review will analyse the clinical and epidemiological research published on oesophageal cancer in South Africa and attempt to identify knowledge gaps that should be prioritised to be filled.

Methods

The Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) guidelines were followed.

The main research questions for this scoping review are:

- What is the scope and extent of clinical and epidemiological research on oesophageal cancer performed in South Africa?
- What is the evidence for the burden of disease of oesophageal cancer in South Africa?
- What curative and palliative management strategies for oesophageal cancer were investigated in the South African setting?
- What research gaps exist on oesophageal cancer in South Africa?

An online search was performed using Pubmed, Medline and EBSCOHost search engines. We used the following search terms, 'oesophagus' or 'oesophageal' and 'cancer' or 'carcinoma' or 'oesophageal squamous cell' and 'South Africa' or 'South African'. We then used cross-referencing and performed a manual search to identify additional relevant articles. Eligibility criteria included all articles published on oesophageal squamous cancer in South Africa in English. Case reports, review articles, letters, book chapters, dissertations and conference presentations were excluded. Studies that focused on the genetics of oesophageal cancer and studies based on laboratory work without clinical components were excluded. Articles were digitally retrieved where possible. Those that were not available were manually sought using the University of KwaZulu-Natal (KZN) library. All articles published from 1950 up to the end of 2020 were included. Exclusion criteria were studies that were not from SA, studies not on oesophageal squamous cell carcinoma, genetic and laboratory-based studies and review articles. Abstracts were screened for relevance and those not fulfilling the inclusion criteria were excluded at this stage. Full texts of the remaining articles were read and assessed by the main author (L.F.). Articles found to be unsuitable were excluded at this stage. Exclusion criteria were studies not from South Africa, studies not on oesophageal squamous cell carcinoma, genetic studies, laboratory-based studies and review articles. Required data items were extracted from the eligible articles and grouped according to the topic.

Ethical considerations

This article followed all ethical standards for research without direct contact with human or animal subjects.

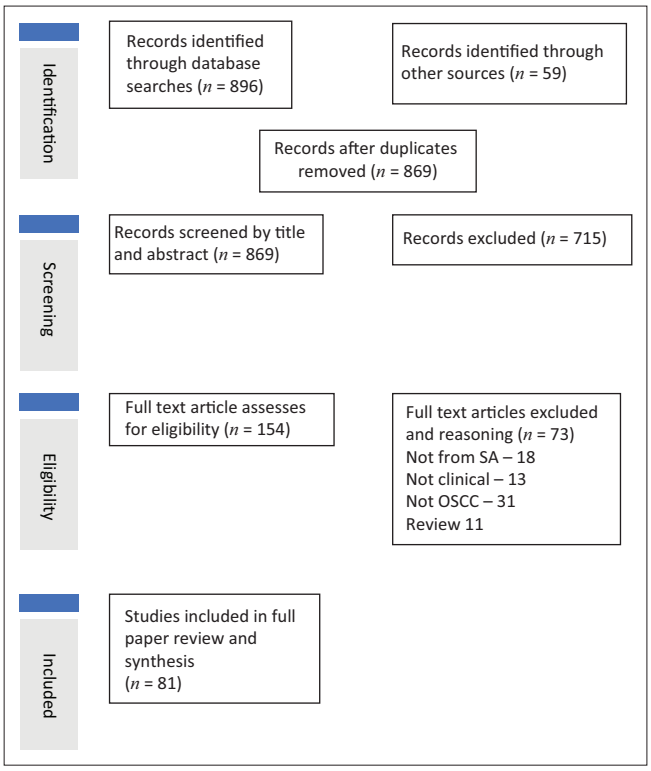
Results

Eight hundred and ninety-six articles were identified on the online search. Further, 59 articles were added after cross-referencing and manual searching. After removal of duplicates, 869 articles remained. Screening by title and abstract led to the exclusion of 715 articles. Full text was reviewed in 154 articles where further 73 articles were excluded, leaving 81 articles. Reasons for exclusion of full text articles were: Not predominantly South African ($n = 18$), non-clinical ($n = 13$), not predominantly squamous cell carcinoma of the oesophagus ($n = 31$) and review articles ($n = 11$) (Figure 1).

As shown in Figure 2, there was a marked decrease in the number of studies on the topic after the year 2000. Studies on surgical management of the disease are non-existent after 2000 and the focus has consistently moved from curative to palliative management over time. The majority of studies investigated risk factors for oesophageal cancer.

General audits

We found nine articles that were published as audits on oesophageal cancer patients presenting to certain institutions or regions.[6,7,8,9,10,11,12,13,14] Five articles published between 1950 and 1980 first noted the increasing incidence, the predominance



OSCC, oesophageal squamous cell carcinoma; SA, South Africa.
FIGURE 1: Prisma flow diagram.

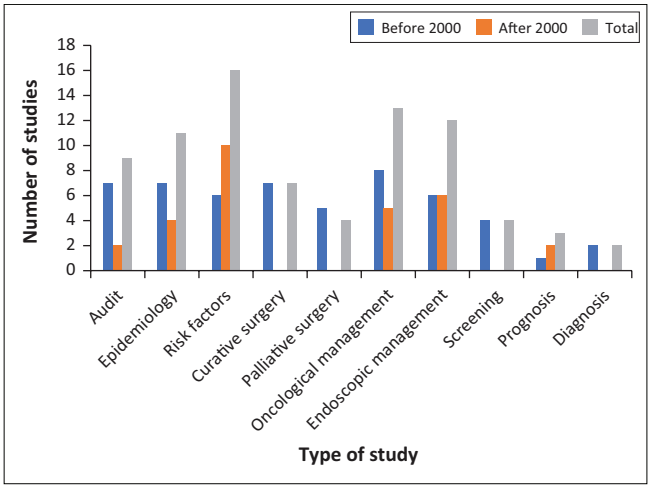


FIGURE 2: Clinical research on oesophageal cancer in South Africa.

of squamous cell carcinoma and postulated on the causal relationship with traditional beer. The two studies with the largest number of patients, both comprising over 1700 patients, were published during the 1980s.[11,12] Werner and Bryce reported that just over 10% of patients were eligible for radical treatment, which included neoadjuvant chemoradiotherapy followed by surgical resection and postoperative radiotherapy, if needed. The majority of patients were treated palliatively with chemoradiotherapy. The median survival was about 11 months for patients treated with curative intent and 6 months for those treated palliatively.[11] Mannell and Murray reviewed 1926 oesophageal cancer cases from different institutions over three years between 1985 and 1988 as part of the National Study group for oesophageal cancer. Seventy eight per cent of patients presented at an advanced stage

(stage 3). Thirteen percent of patients underwent oesophageal resection with an operative mortality of 14%, whilst 37% of them were treated with intubation only.[12]

Incidence

Of the 11 articles published on the incidence of oesophageal cancer in South Africa, seven articles calculated the age-standardised incidence rate (ASIR) (Table 1). Three articles talked about national incidence, whilst the rest used regional data, mostly from the Eastern Cape (EC).

In the early 1960s, Oettle found a wide variation in the number of hospital admissions for oesophageal cancer ranging from less than 1 per 100 to more than 20 per 100 beds.[15] Sitas and Isaacson reported oesophageal cancer to be the commonest histologically diagnosed cancer in black males making up 25% of all cancers, the third commonest in black females making up 10% of cancers.[16]

Sitas reported a summary of cancer registrations to the National cancer registry of South Africa for 1988. The ASIR for oesophageal cancer was 18.15 and 7.38 /100 000 for males and females, respectively.[17]

Five papers reported on the incidence of oesophageal cancer in the EC province and worked out ASIRs for the region. For males, the ASIR ranged from 23.2 to 76.6 per 100 000 and for females, it ranged from 14.5 to 36.5 per 100 000.[18,19,20,21,22]

Two papers reporting data from the Gauteng province produced very different results when calculating ASIRs. Kneebone and Mannell analysed patients admitted to a single hospital in Soweto in the Gauteng province and calculated age-standardised incidence rates of 125 and 37 per 100 000 for males and females, respectively,[23] whilst Gould et al. found the incidence of histologically confirmed oesophageal cancer in Gauteng to be 2.27 per 100 000.[24]

In another single institution study in Gauteng, the prevalence of oesophageal cancer was found to be 0.96% amongst patients referred for upper gastrointestinal endoscopy.[25]

The male-to-female ratio ranged from 1:1 to 4:1.[14,19,20,26,27,28]

Risk factors

The most commonly studied risk factors for oesophageal cancer in South Africa were tobacco smoking, alcohol and diet.

Table 2 summarises the findings of case control studies investigating the association of oesophageal cancer with tobacco and alcohol exposure in South Africa. Four case control studies showed increased risk of oesophageal cancer with both tobacco and alcohol exposure,[29,30,31,32] whilst one other case control study, investigating tobacco-related disease, found tobacco smoking to increase the risk of oesophageal cancer.[33] Five other case control studies investigating both risk factors found tobacco to have a positive association with oesophageal cancer, whilst alcohol exposure (including traditional beer) was not associated with an increased risk of the disease.[34,35,36,37,38] One study specifically looked at traditional beer as a risk factor for oesophageal cancer and found it not to be a risk factor.[39]

Sewram et al. found a complex relationship between diet and risk of developing oesophageal cancer. Whilst there seemed to be an increased risk with consumption of sorghum and some leaves of wild plants, there was no increased risk with consumption of dry beans, pickled food or frequency of maize intake. There was an inverse relationship with intake of fresh fruit and vegetables.[40]

Other risk factors postulated to increase the risk for oesophageal cancer in South Africa include human papilloma virus (HPV) and non-acid reflux,[41,42] whilst no relationship to *Helicobacter pylori* could be found.[43]

Loots et al. found that 78% – 94% of patients with oesophageal cancer had low-to-medium socio-economic status, whilst 86% had poor dental health.[44]

Gender, presentation, diagnosis and prognosis

Two studies, published after 2000, highlighted differences between males and females with oesophageal cancer in South Africa. Both the studies found that female patients were older and less likely to be past or present consumers of tobacco and alcohol.[28,44]

Studies looking at the time of presentation from the onset of symptoms were published after 2000 and showed that patients in South Africa with oesophageal cancer are

TABLE 1: Studies reporting on age-standardised incidence rate for oesophageal cancer.

Author	Year	Area studied	ASIR for males	ASIR for females
Rose	1975	Eastern Cape	35.20	16.70
Kneebone	1985	Gauteng	125.00	37.00
Sitas	1994	South Africa	18.15	7.38
Makaula	1996	Eastern Cape	46.70	19.20
Somdyala	2003	Eastern Cape	76.60	36.50
Somdyala	2010	Eastern Cape	32.70	20.20
Somdyala	2015	Eastern Cape	23.20	14.50

ASIR, age-standardised incidence rate.

TABLE 2: Case control studies of tobacco and alcohol as risk factors for oesophageal cancer in South Africa.

Study findings	Author	Year
Increased risk with tobacco and alcohol	Segal	1988
	Pacella-Norman	2002
	Dlamini	2005
	Sewram	2016
Increased risk with tobacco only	Stein	2008
Increased risk with tobacco but not with alcohol	Bradshaw	1969
	Bradshaw	1974
	Van Rensburg	1985
	Sammon	1992
	Sammon	1998
No increase in risk with traditional beer	Matsha	2006

diagnosed and receive definitive care 4 and 7 months after the onset of symptoms, respectively.[45,46] The majority of them show signs of malnutrition and have hypoalbuminaemia at presentation.[14]

The prognosis of oesophageal cancer in South African patients was highlighted in three studies. Fifty per cent of patients were deceased at 4 months, whilst the one-year survival ranges from 1% to 11%. Patients with disease localised to the oesophagus who underwent oesophagectomy had a 30% three-year survival rate.[23,26] Performance status, dehydration, weight loss and race were the strongest predictors of survival in a retrospective review of a database from a single institution over a 30-year period.[47]

One study reported on the value of pre-operative imaging in the form of computed tomography (CT) scan and found it inadequate in assessing resectability of oesophageal cancer.[48]

Management

Thirty-eight studies dealt with the management of oesophageal cancer in South Africa. Twenty seven were retrospective studies.

Surgery

All research on surgical management of oesophageal cancer in South Africa was published prior to 2000. Seven papers presented results of radical surgery with intent to cure for oesophageal cancer between 1968 and 1991 (Table 3). Mortality ranged from 4.3% to 24.0% and five-year survival from 2.4% to 13.0%. Data on the role of radiotherapy with or without chemotherapy are conflicting. R0 resection was found to be the best indicator of survival.[11,49,50,51,52,53,54] Five studies reported on palliative surgery for oesophageal cancer. The most common procedures performed were palliative bypass and oesophagectomy. Mortality rates were between 10.0% and 50.0%.[49,50,55,56,57]

Mechanical endoluminal therapy

Seven papers described the use of plastic stents to palliate dysphagia in patients with oesophageal cancer. The stents used were Celistin, Procter-Livingston and Didcott dilator tubes. These stents provided relief to dysphagia and symptoms of trachea-oesophageal fistula as well as improvement of nutritional status of patients but with high procedure-related mortality rate of between 15% and 40% and no long-term follow-up data.[58,59,60,61,62,63,64,65]

The first study to use metal stents compared them to plastic stents and found metal stents to have superior efficacy but with greater cost.[66]

Five studies investigating the palliation of malignant dysphagia using self-expanding metal stents (SEMS) were published after the year 2000. They found the insertion of metal stents to be a safe and effective form of palliation, even without the use of fluoroscopy. Resource-constraint was highlighted as a problem.[46,67,68,69,70]

TABLE 3: Studies on curative surgery for oesophageal cancer.

Author	Year	*n*	Mortality (%)	2-year survival (%)	5-year survival (%)
DeMoore	1968	20	14.0	10	-
Werner	1987	NS	14.0	-	-
Procter	1968	107	24.0	-	-
	1973	250	12.0	-	2.4
Mannell	1980	24	4.3	-	-
	1987	92	12.0	-	10.0
	1991	108	12.0	-	13.0

TABLE 4: Studies of palliation of oesophageal cancer by placement of self-expanding metal stents in South Africa.

Author	Year	Type of study	*N*	Main finding
Motillal	2007	Prospective cohort	58	SEMS were acceptable palliation for TOF
Liakos	2010	Retrospective review	30	SEMS preferred to radiotherapy
Govender	2015	Retrospective review	453	SEMS without fluoroscopy safe
Loots	2016	Retrospective review	105	Proximal placement of SEMS associated with shorter survival
Nel	2019	Retrospective review	97	Access to SEMS limited in some centres

SEMS, self-expanding metal stents; TOF, tracheo-oesophageal fistula.

Oncological therapy

During the late eighties and early nineties, six trials, mostly phase 2, investigated efficacy and toxicity of chemotherapeutic agents in patients with advanced oesophageal cancer. The agents investigated were trimetrexate, ifosfamide, 5-fluorouracil, cis-retinoic acid and interferon alpha-2a. None of the studies showed a good enough survival or low enough toxicity rate to warrant routine use in clinical practice. The addition of chemoradiotherapy to oesophageal intubation did not show benefit.[71,72,73,74,75,76]

External beam radiotherapy (EBRT) was shown to be equivalent to chemoradiotherapy in patients with locally advanced oesophageal cancer with a median survival between four months and six months in a randomised controlled trial.[77]

A group from Johannesburg published three papers on the use of fractionated high dose brachytherapy in patients with advanced oesophageal cancer and reported it to be the best modality for palliation with 12-month survival of up to 19%. The optimal dose was concluded to be between 16 and 20 grays given in two doses one week apart. The addition of EBRT did not add any benefit.[62,78,79]

Three multi-national studies on the treatment of oesophageal cancer included patients from South Africa. The addition of EBRT to brachytherapy improved dysphagia relief when compared to brachytherapy alone in the palliation of oesophageal cancer with no difference in survival or toxicities between the two groups.[80] In another study, toxicity and efficacy data from the uses of carboplatin and docetaxel in combination suggested that it should not be used in oesophageal cancer patients.[81] Sharma et al. surveyed African

radiotherapy centres, including three from South Africa and found that whilst radiotherapy did form a major component of oesophageal cancer palliation, there was little agreement between the centres on the protocols that should be followed.[82]

Screening

Three papers reported brush cytology of the oesophagus to have a good yield and predictive value in the EC.[83,84,85] McKnight et al. studied the role of Ca-19-9 as a tumour marker for oesophageal cancer and found the sensitivity and specificity to be too low to be used as a screening test.[86]

Discussion

To our knowledge, this is the first scoping review of research on oesophageal cancer in South Africa. Loots et al. and Alaouna et al. published systematic reviews on clinical and genetic research on oesophageal cancer in South Africa, respectively,[5,87] but this is the first article to map the existing evidence and identify key research gaps in accordance with the purpose for scoping reviews.[88]

Considering the endemic nature of the disease in South Africa, it is surprising that there were only 81 articles, 60% of which were retrospective and were published over seven decades and that less than 40% of the papers were published after the year 2000 (Figure 3).

General audits

The increasing incidence of oesophageal cancer in South Africa was first noted in articles published during the 1950s and 1960s. Despite the majority being based on single-institution studies, these papers highlighted a few aspects of the disease that is still pertinent in South Africa today. Firstly, most patients came from the EC and KwaZulu-Natal (KZN). There were some reports with high numbers from Western Cape and Gauteng provinces, but these studies reported a high male:female ratio, suggesting that the patients may be migrant workers, most likely from the two aforementioned provinces.[7,10,11] Secondly, the role of dietary factors was postulated. Thirdly, the advanced stage of disease at presentation was highlighted. Oesophagectomy or oesophageal bypass was relatively common operations, particularly as palliative procedures.[6,8,9,10] Two papers published after 2000 underscored these facts.[13,14] One multi-institutional trial from five different provinces provided valuable data on the burden of disease, clinical presentation and treatment of patients with oesophageal cancer in South Africa during the late 1980s.[12] There is a need for a similar study with updated data.

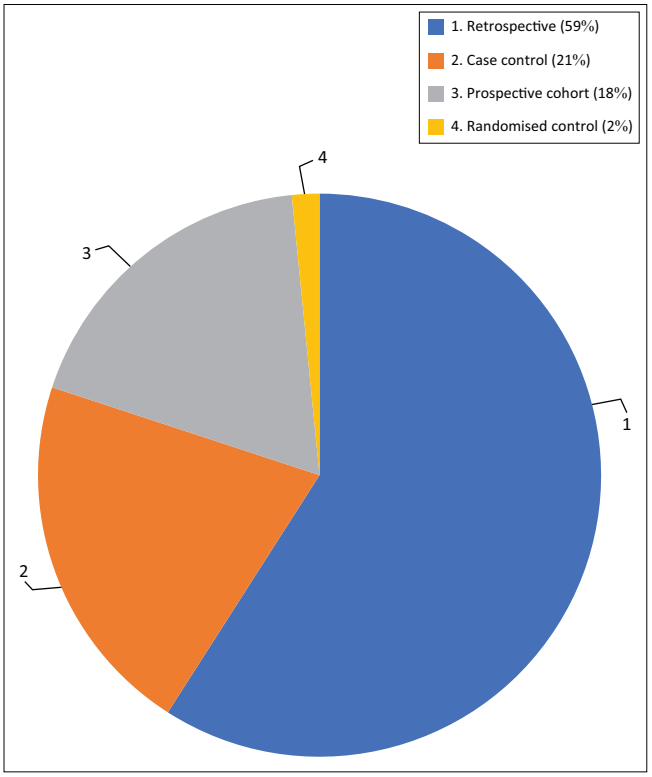


FIGURE 3: Study methodology employed in oesophageal cancer research in South Africa (N = 81).

Incidence

The true incidence of oesophageal cancer in South Africa was difficult to determine from the available literature, mainly because of a discrepancy between population and laboratory-based data. Most of the information on oesophageal cancer incidence in South Africa comes from data collected from specific population groups or geographical areas and do not include all South Africans. The difficulty in ascertaining the true incidence in South Africa is highlighted by attempts by international papers at reporting the incidence in South Africa. Not only are the data from these papers different from those published in South African papers, but there is a three-fold difference in incidence rates between these international papers, despite them quoting figures from the same year.[89,90]

Population-based data from the EC show a two-to-threefold difference in incidence between different studies as well as a decreasing trend in incidence after 2000.[18,19,20,21,22] The vast range may be because of a number of factors, including time period, area studied and data collection methods. Another limitation of the studies from the EC is the lack of histological confirmation in all cases. This is because oesophageal cancer is often diagnosed clinically and treated without histological confirmation. Migratory labour patterns also provided challenges when collecting data on oesophageal cancer from the EC as it may have resulted in inaccuracies with data collection if patients did not return home when diagnosed or if they did return, but were not counted at the time of the population census. Despite these limitations, valuable information can be gleaned from these studies as the data are extracted from a well-established population-based cancer registry.

Data from other provinces are even more inconsistent with up to 30-fold difference in incidence rates. Most of the data were collected retrospectively and subjected to some bias because of missing information.[23,24]

Globocan, which groups South Africa with Botswana, Lesotho, Namibia and Eswatini as Southern Africa, reports the incidence of oesophageal cancer in the region as 9.4 and 4.8 per 100 000 for males and females, respectively.[91]

According to the National Cancer Registry, which is a histology-based registry, the age standardised incidence rate of oesophageal cancer in South Africa is 5.2 and 2.9 per 100 000 for males and females, respectively.[92] This is much lower than population-based data shown in Table 1. One reason for this discrepancy is the fact that most of the population-based data quoting age-standardised incidence rates were obtained from the EC which, unlike other parts of South Africa, falls within the African oesophageal cancer corridor. The incidence in the area will, therefore, be higher than that of the rest of South Africa and this should be taken into consideration when ascertaining disease burden.

Data on mortality rates are equally inconsistent.[89,93] It is evident from the wide range of incidences reported that the true incidence of oesophageal cancer in South Africa is unknown. This represents a significant gap in the knowledge of oesophageal cancer in South Africa, which requires epidemiological studies to be undertaken to fill. When reporting on the burden of disease, authors should note the national incidence as well as the incidence in high-risk areas. At present, it would seem that these areas include the EC and KZN. A population-based registry, similar to the one in the EC, should be started in KZN.

Risk factors

It is well known that tobacco and alcohol are both risk factors for oesophageal cancer and that their effects are synergistic.[94] It is also known that the effects of these substances are dependent on racial and geographic factors.[95] In South Africa, the evidence for tobacco as a risk factor for oesophageal cancer is strong, whilst that for alcohol is conflicting. A number of studies investigating both risk factors found a correlation with both, but there are many that failed to show a correlation with alcohol whilst showing one with tobacco. The evidence for traditional beer is equally conflicting.

There is a significant amount of evidence of the inverse relationship between oesophageal cancer and intake of fresh fruit and vegetables but whether a specific nutrient in the South African diet increases the risk of oesophageal cancer is not clear.

There is not enough evidence linking any other risk factor to the disease in the South African setting.

The only two risk factors with consistent findings are, therefore, tobacco and diet low in fresh fruit and vegetables. Other risk factors need to be studied in South Africa.

Gender

The studies comparing males and females with oesophageal cancer are single-institution studies only and can, therefore, not be applied to the whole of South Africa. These imply that females are older and do not share the exposure to tobacco and alcohol with males. If this is true, then there may be other, yet unidentified risk factors that need to be elucidated in South African female patients with oesophageal cancer.

Prognosis

The fact that patients with oesophageal cancer in South Africa present late with poor prognosis is not in doubt. In fact, it seems that the problem is bigger in South Africa compared to other high-incidence areas like China.[96]

Management

Curative

Surgical resection, endoscopic excision and definitive chemoradiation (DCRT) are the only potentially curative treatment options for oesophageal cancer,[97] yet there is very little research available from South Africa regarding these modalities. Advanced stage at presentation, lack of a screening programme and limited access to oncological services are some of the reasons for this.

The most worrying problem is the paucity of research on curative surgery for oesophageal cancer in South Africa. Only five studies were identified and no research on the topic was published since the early 1990s. The limitations of these data are clear and studies on outcomes and long-term follow-up of patients undergoing oesophagectomy for oesophageal cancer in South Africa over the last two decades are needed.

Palliative

Most research on palliative management of oesophageal cancer in South Africa was performed before the beginning of the century. The value of these studies is limited because modern palliative options differ vastly from those used before 2000. The biggest difference came with endoscopic palliation of dysphagia, where plastic oesophageal stents were replaced with SEMS. These stents were first studied in South Africa in the late 1990s and since then, only a handful of studies investigated their efficacy. Because of resource availability as well as clinical and economic factors, it does seem that it is the most viable palliative option in South Africa. It offers that rapid relief is easy to administer and the procedure can be performed with limited resources. There are no studies assessing the quality of life and survival of patients in whom SEMS were inserted and this represents another gap in research.

A promising palliative modality studied in the South African setting was endoluminal brachytherapy. Unfortunately, it was only studied by one group at a single centre and whilst results were promising, its use will be limited by resource

constraints. Cost comparison between endoluminal brachytherapy and the use of SEMS in South Africa need to be performed to determine the role of endoluminal brachytherapy in the clinical setting in South Africa.

The use of EBRT for palliation of dysphagia was reported in only a few studies, and although survival data were reported in one study, its exact role has not been established. This modality is also limited by resources and cost.

The studies on chemotherapy failed to produce any breakthrough in the management of oesophageal cancer in South Africa.

Screening

Brush cytology was the only screening technique studied in South Africa and it showed promising results. These studies were all performed before the year 2000 and further investigation in this area is required. One possible reason for the lack of screening studies is the cost implications of a screening programme. A feasibility study performed in a high incidence area will provide valuable information and may stimulate further research. The value of screening in high incidence areas has been highlighted.[98]

Summary of findings

Oesophageal cancer is endemic in the EC and KZN. The age-standardised incidence is at least 15 per 100 000 for females and 25 per 100 00 for males in the EC, whilst the incidence in KZN is unknown. Smoking and a diet low in fresh fruit and vegetables are known risk factors. Females are older and do not share the same exposure to tobacco as males. The majority of patients present late with advanced disease and are treated palliatively, mostly with endoscopic stenting. Palliation of dysphagia with SEMS is safe and can be performed safely without the need for fluoroscopy.

Research gaps

Research gaps that require exploration include the national burden of disease, data on the results of curative management like surgery and definitive chemoradiotherapy and survival patterns at major treatment centres. Follow-up studies looking at quality of life and survival of patients treated palliatively with stent insertion are non-existent. Oncological therapeutic guidelines are also needed. These gaps should be filled by academic centres from high incidence areas like the EC and KZN. In addition, a national population-based registry needs to be started and the potential feasibility of screening high-risk populations should be investigated in the modern era.

Conclusion

It is clear that research on oesophageal cancer in South Africa has been neglected with the result that we have not progressed much since the 1970s when Procter observed that it is common in South Africa, presents late and has a very poor prognosis. Research on the topic has decreased since the year 2000 with no new knowledge being obtained on curative management of the disease in South Africa. These issues need to be addressed urgently in order to formulate optimal management guidelines and improve the prognosis of this disease in South Africa. A nation-wide collaborative project would be the ideal solution to this problem.

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Competing interests

The authors declare that they have no financial or personal relationships that may have inappropriately influenced them in writing this article.

Authors' contributions

L.F. contributed to the conceptualisation, methodology, analysis and writing of this article. C.A. contributed to the conceptualisation, methodology and writing of this article and also assisted with the review, editing and supervision.

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Data availability

All data are available from the corresponding author, L.F., upon reasonable request.

Disclaimer

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