# Cancer magnitude in west Libya and study the effect of dietary habits in cancer incidence and cancer treatment using nanotechnology

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***Abstract*—This study provides an overview of magnitude of cancer incidence in West Libya form 2009 to 2013, to identify the role of bad meal in developing cancer, and to suggest further nano-technology research for treating cancer. Among 1851 cancer cases, 1472 cases (79.5%) occur in people aged above 40 years old. The most affected age by cancers was in males aged 61-70 years and in females aged 41-50 years. Lung cancer is the principal cancer in men accounting for 21% of cases, while breast cancer is the leading malignancy in women accounting for 35% of cases. Among 100 interviewed males and females with colon, stomach and liver cancers, 50% of them were eating a lot of red meat, canned and fast foods, whereas 20% of all cases were eating a little of fruits and vegetables. 22% of all cases were more likely to have a positive family history of cancer and 8% of all cases had chronic diseases such as diabetes, hypertension, urinary tract infection and gastritis. Good efforts have been made to improve the treatment of cancer by using nanomedicines in order to enhance the performance of chemotherapy and reduce systemic side effects.**

***Index Terms*—West Libya, cancer incidence, nanomedicines.**

## I. INTRODUCTION

At least, 10 million of new cancer cases are globally reported every year and may be expected to increase to 15 million every year in near future [7]. Cancer represents the second cause of mortality after cardiovascular diseases [8]. WHO addressed that two third of worldwide of cancer deaths are due to four risk-factors. These risk-factors include food-related such as colon, prostate, stomach, liver, mouth and pharynx; tobacco-related such as lung; infection-related such as liver, cervix and lymphoma; and hormone-related such as breast cancer [9]. Also, they addressed the relationship between total cancer risks and other factors including dietary habits, smoking, ratio of animal to plant food eaten, the quality of food, cooking methods and lifestyle.

Nutrition is responsible for approximately 30% of all cancer risks in devolved countries and 20% in developing countries. However, a previous study documented that fruits and vegetables, and plant constituents such as fibers, and antioxidants maintain a healthy body and a lower cancer risk [9]. Healthy nutrition is a process in which right food is eaten and used by the body for growth and to replace tissues. It can assist cancer patients get the diet they need to keep up their strength and fight infection [4].

Traditionally, cancer was treated by chemotherapy, radiation and surgery. Cancer treatment by chemotherapy is based on chemicals which used to kill cancerous cells. The chemicals used in the treatment could kill healthy cells which not harmed by cancer. Recently, the field of cancer treatment has been improved by many of research groups. They found that the nanotechnology techniques offer new methods which can be used for the targeted delivery of drug molecules to the diseased cells [10,11]. Based on nanotechnology, nanomedicines have been synthesized from nanomaterials in order to enhance the performance of drugs and reduce systemic side effects [12]. This study aimed to investigate the magnitude of cancer incidence by age and sex in West Libya, to identify the role of bad meal in developing cancer and to suggest further nanotechnology research for treating cancer.

## II. CANCER INCIDENCE BY AGE

Data were obtained from Misurata National Cancer Institute Registry and collected from medical records and other facilities and mortality data from multiple geographic sites in West Libya including Misurata, Zliten, Khums, Sert, Jofra,

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Kaser Kayar, Tarhona, Tripoli, Ben walled, Tawarga and Misilata.

A total of 1851 cases were diagnosed with cancer during 2009 to 2013. Among 1851 cancer cases, 1472 cases (79.5%) occur in people aged above 40 years old. Figure 1 shows continuous rise in number of cancer cases with increasing age. This indicates that most cases were older. The small fall in the age group 91-100 years may be due to this age group having smallest Population.

Approximately, 21% of cancer cases are diagnosed in people aged 61-70 years. Around 18% of all cancer cases occur in adults aged 21-40 years. Cancer is relatively rare in kids and teenagers under 20 years and represents around 2.3% of all cancer cases (Figure 1). In 2006, Sabratha Cancer Registry implied that incidence of cancer is the least in the age group below 15 years [7]. From 2009 to 2013, the most affected age by cancers was in males aged 61-70 years and in females aged 41-50 years.

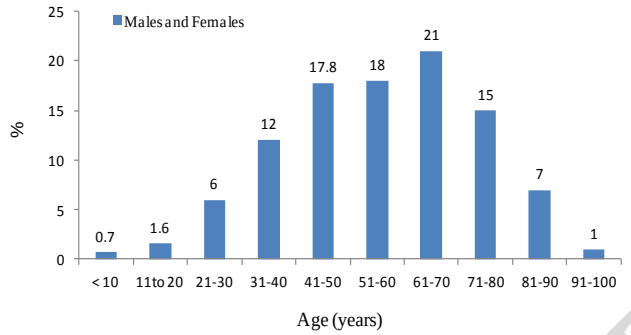



Fig 1. Total percentage of distribution of cancer patients according to age from 2009 to 2013 in west Libya.

## III. CANCER INCIDENCE BY SEX

The percentage of men and women with cancer was 51% and 49%, respectively. This indicates that men are almost 2% more likely than women to develop cancer. Excluding breast cancer, the percentage of men and women with cancer was 50% and 32%, respectively. This explains that men are almost 18% more likely than women to develop cancer. This difference is due to difference in incidence at various body organs. For example, prostate cancer occurs only in males, breast and ovary cancers (females only) and lung cancer (mostly in males) [7].

In the present study, more than 23 different types of cancer were observed, but three common cancers including breast, colon and lung account for over 45% of both males and females. Lung cancer is the principal cancer in men accounting for 21% of cases. Lung cancer represents the most common cancer in West Libya [7]. Colon and prostate cancers are the next most common accounting for 15% for each.

Breast cancer is by far the leading malignancy in women accounting for 35% of cases. A previous study reported that breast cancer is one of serious health problem in Libyan women [3]. Colon cancer is the second most common cancer in women accounting for 15% of cases, followed by ovary cancer accounting for 11% of cases. Figure (2) shows the main type of cancer in infected men and women.

Cancer incidence in both sex may be related to environmental exposure, greater stress [8], cigarette smoking and bad dietary habits.[9]. Sex-specific incidence rates were observed substantially between West Libya cities. The most collected data was from Misurata, Zliten and Khums (Figure 3).

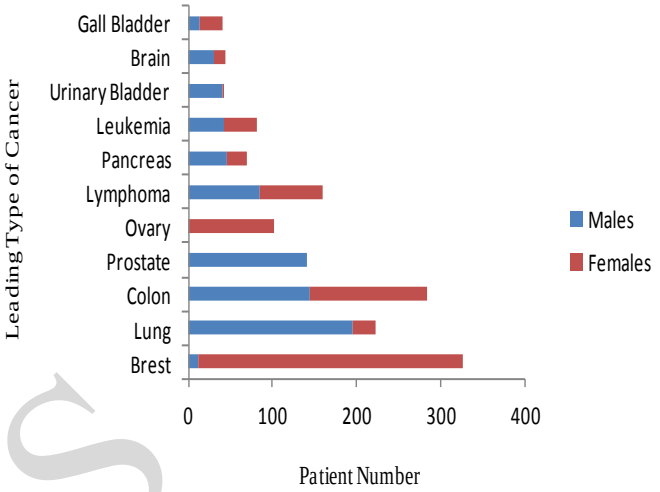



Fig 2. Leading type of cancer in males and females from 2009 to 2013.

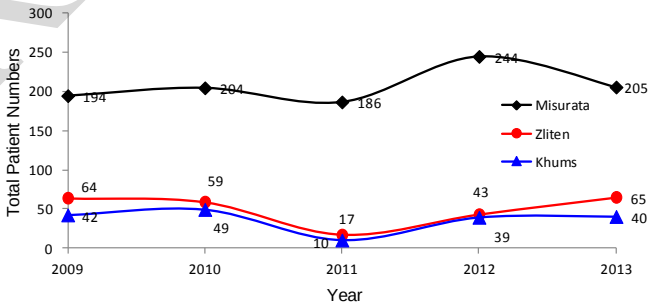



Fig 3. Region distribution of cancer patients from 2009 to 2013.

## IV. CANCER MORTALITY BY SEX

With regard to mortality, there were 217 cancer deaths accounting for 12% among all males and females. Men are almost 2% more likely than women to die from cancer in West Libya regions. Worldwide, male deaths represent more frequently than females with cancers. Cancer mortality was 8.7% of all cases in Benghazi in the period from 1991-1996 [8].

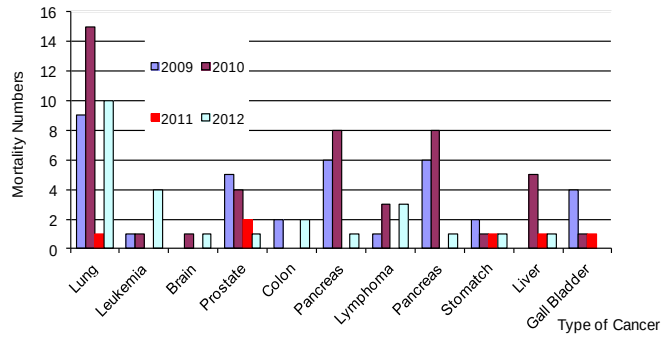
In Arabic countries including Bahrain, Iraq and Kuwait cancer was the major fatal disease and made up more than 10% of deaths. The increase in cancer deaths in Libya may be due to

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the lack of improvement in survival rate of major cancers [8]. Also, Libya loses to national cancer control plan like some countries in Middle East [2].

Respectively, lung, pancreas and prostate were the commonest causes of cancer death in males; while, lung, ovary and beast were the most fatal cancer among females. Lung cancer is the most principal type of cancer in Libya and worldwide [8].Figure (4) shows some selected cases of cancer mortality in men and women.

- **Male**




- **Female**

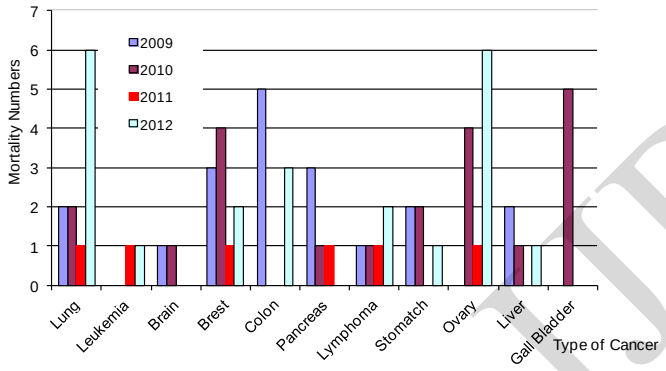



Fig 4. Some selected cases of cancer mortality in males and females from 2009 to 2012.

## V. DIETARY HABITS AND CANCER

### *A. Cross-Sectional Study*

A self administered questionnaire was conducted on one hundred Libyan patients aged 45-85 years (58 males and 42 females) at National cancer Institute, Misurata, during the period from November 2013 to March 2014. Patients had colon, liver and stomach cancers. Data was collected on a form (questionnaire) during the interview with each patient. Participants were asked to report their dietary habits during the past year. The questions contain a list of many food items including fruits, vegetables, grains, oils, dairy products including eggs, meats (red meat, poultry, fish and tuna), beverage, commercially prepared products such as dietary supplements, dry cereals and fast foods. The questionnaire also included questions about past medical history, family history of cancer, and lifestyle factors including exercise, smoking status, and alcohol intake.

There is a clear association between life style, dietary habits and human cancer incidence [5]. Among males and females, 50% of them were eating a lot of red meat, canned and fast foods especially fried potatoes (Figure 5). 20% of all cases were eating a little of fruits and vegetables. The continuous consumption of red meats (especially in fast foods) such as beef and lamb, processed meats and saturated fats may enhance diet-related cancers such as liver and colon cancers [6]. Because these foods may generate at high cooking temperature different classes of carcinogenic compounds such as heterocyclic amines containing compounds and polycyclic aromatic hydrocarbons In comparison, diets rich in high-fibers including whole grains, and raw vegetables and fruits may protect from cancer incidence because they are naturally low in fat and rich in antioxidants and anti-cancer constitutes [6]. This food style is mostly vegetarian and may protect against colon cancer [5] and stomach cancer and other food-related cancers by supporting the immune system and decreasing cancer risks [1].

In the present study, 8% of all cases had chronic diseases such as diabetes, hypertension, urinary tract infection and gastritis. Also, 22% of all cases were more likely to have a positive family history of cancer. Generally, patients tended to less education and less physically active. Men were more commonly had a history of smoking (90%). Cigarette smokers represent more than 60% of men in Libya [9]. In Eastern Libya, the main reason of some cancers was tobacco related according to World Health Organization WHO [2].

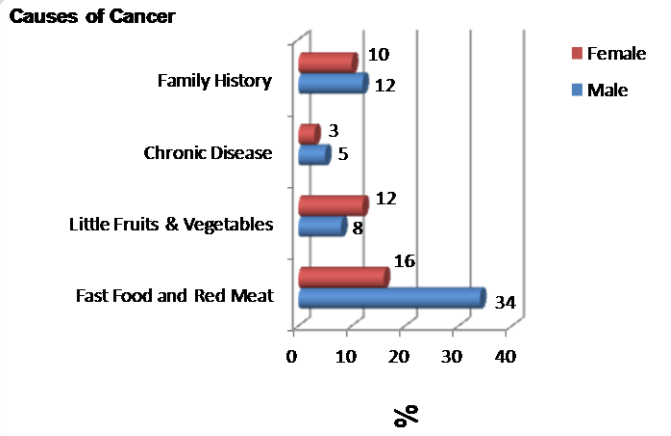



Fig 5. Some causes of food-related cancer.

## V1. THE APPLICATION OF NANOTECHNOLOGY IN CANCER TREATMENT

Nanotechnology deals with very tiny volumes of materials, which have typical dimensions ranging from subnanometer to

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several hundred nanometers. Nanostructured materials have attracted much attention in last decade due to their potential applications in industry and nanobiotechnology such as nanosensors [13], magnetoelectronic devices [14] and biological systems [15]. Recently, good efforts have been made to improve the treatment of cancer by using nanomaterial such as nanoparticles and nanotubes [16, 17]. Nanoparticles can be produced from a water insoluble pharmaceutical compound such as organic, inorganic and magnetic materials. The produced nanoparticles are used as nanocarries of drugs to enhance the performance of medicines. The molecules of drugs can be attached to or adsorbed or encapsulated in the nanocarries. This technology has been used to improve drug delivery and to overcome some of the difficulties of drug delivery for cancer treatment [18]. The nanocarries (carries concentrated drugs) can be governed by physiological (pressure) and physiochemical (structure, composition and charge) properties [19]. Based on nanotechnology, the carbon nanotubes were used to transport anticancer drugs or radionuclides for cancer therapy using two methods [17]. The first one is to form non-covalent compounds between the nanotubes and the drugs or the radionuclides, while the second technique is depending on the binding of the combinations to the tubes. The research groups still work to improve the cancer treatment by using nanomaterials such as magnetic nanoparticles and nanodots.

## VII. CONCLUSION

In West Libya regions, men are almost 2% more likely than women to develop cancer ,and they are almost 2% more likely than women to die from cancer. The most affected age by cancers was in males aged 61-70 years and in females aged 41-50 years. Lung cancer is the principal cancer in men accounting for 21% of cases, while breast cancer is the leading malignancy in women accounting for 35% of cases.

Our finding strongly suggest that mixed factors including dietary habits such as low levels of fruits and vegetables, high calorie fat /meat diet, high levels of fast foods ; and smoking, environmental exposure, occupational hazards and greater stress may be associated with an increase in cancer incidence. However, continuous consumption of fresh fruits and vegetables, whole grains, healthy fat containing foods such as avocado, olive oil and nuts may prevent cancer incidence.

Nanotechnology can be a good way for future research to improve drug delivery and overcome some of the difficulties of drug delivery for cancer treatment.

## COMPETING INTERESTS

We (authors) declare that we have no conflict of interest.

## ACKNOWLEDGMENT

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