

Introduction

Cardiovascular disease (CVD) is the leading cause of death globally with an estimated 17.9 million people dying from CVD's in 2016, representing 31% of all global deaths; in 2008 25% of deaths in Pakistan were caused by cardiovascular diseases (WHO, 2017; WHO, 2008). There is significant evidence that CVD is and will be a major healthcare problem among Pakistani's with an estimated 40 million individuals in Pakistan suffering from high blood pressure, 32 million from heart disease, 24 million from obesity, 18 million from high cholesterol and 8 million from diabetes (Qaisar et al, 2012; Wasay et al 2014).

Diet plays an important role in the development of CVD and related risk factors. Previous research has shown that low intake of vegetables & fruit and high intake of fat are major risk factors for developing CVD (Wang et al, 2014; Zong et al, 2016). In addition, high intake of salt leads to increased blood pressure which will eventually lead to cardiovascular disease. A WHO Panel of experts recommends intake of fat least 400-500 grams of fruit & vegetables equal to 4-5 servings per day. High intake of fat (especially Trans fat) can for example cause high blood pressure, stroke and also increase blood lipids which can cause arterial clots. The recommendation set by WHO for fat intake is 25% to 35% of total calories.

According to WHO the daily recommended amount of energy intake for males is 2500 Kcalories while for females it is 2000 Kcalories. Excessive daily energy intake is not directly reported as a risk factor for developing CVD, although it can lead to obesity which can ultimately lead to the development of cardiovascular disease. . . Previous research has reported high intake of sodium as a major risk factor for high blood pressure which can cause CVD. The recommendation of WHO advises to limit the intake of Sodium to 5g per day for a healthy blood pressure.

The aim of this literature review is to portrait the dietary intake related to cardiovascular heart diseases (CVD) of the Pakistani population living around the globe. The question which needs to be answered is as follow is:
What is the dietary intake related to Cardio Vascular heart Diseases (CVD) of Pakistan people living around the globe?

Methods

This study is a literature review related to dietary intake of Pakistani's. The main source for the papers is PubMed (Mesh database). The second search engine is Google Scholar. Both search engines resulted into 558 papers related to nutrition of indigenous and migrant Pakistani's (doubles deleted), see also appendix 1. Subsequently 505 papers were excluded based on a review of title/abstract. During this s Excluded: **505** ; reporting dietary intake/dietary habits & CVD were included which resulted in 53 papers. It resulted finally into 13 papers which met the criteria. Figure 2 gives an overview of the review tree. There are different reasons for exclusion of papers in the last step which resulted into just 13 papers which met the criteria. The reasons are highlighted in figure 3. To ensure that the papers met the criteria; the final step was repeated by the Phd student to doublecheck the procedure in which the papers were reviewed based on the checklist.

Results:

The results of the paper review are given in the following table. This table is reporting the dietary intake. Looking at the study characteristics, 4 papers were missing the survey year (Anjum et al, 2004; Sohail et al, 2002; Simmons & Williams, 1997 & Heald et al, 2002). There are 2 papers not reporting the age of the study group (Anjum et al, 2004 & Sohail et al, 2002). Sohail et al (2002) is not reporting age and Heald et al (2002) is not giving any detail on the socio economic background. To track this missing information, the authors were contacted by email but they did not respond.

Table: dietary intake related to CVD food nutrient or food group

Nr.	Location	Survey year(s)	Recommend/desirable/advised intake	Energy (Kcal)	Fruits(g)*	Vegetables (g)*	Sodium	Fat (g)
Indigenous Pakistani								
P1	Peshawar	2008-2009	1) 2266 Kcal (WHO recommended intake) 2) Adequate intake defined is: 67,3 - 100% of recommended intake	Obese(13,1%): 2260Kcal Overweight(3,1 %): 2058Kcal Normal weight(73,0%): 1651 Kcal Under weight: (10,8%) 817 Kcal	NR*	NR*	NR*	NR*
P2	Karachi	NR*	1) Fruit: 2-4 servings per week 2) Vegetables: 3-5 servings per week 3) Fats & oils: sparingly per week	NR*	1) 4-5 p/w: 86 (29%)* 2) 2-3 p/w: 56(19%)* 3) ≤ 1 p/w: 152 (52%)*	1) 4-5 p/w: 140 (48%)* 2) 2-3 p/w: 91 (31%)* 3) ≤ 1 p/w: 62 (21%)*	60%	Ghee: 77% Oil: 23%
P3	Faislabad	1991	1) Recommended Kcal intake: 1800,1 2) Fat: NR*	1525,0 Kcal	NR*	NR*	NR*	59,6g
P4	Peshawar	NR*	WHO panel: 1) 400g of fruits & vegetables a day:(5 servings a day)	NR*	NR*	L: 13,5% D: 77%		NR*
P5	Pakistan	2002 – 2003	WHO panel: 1) 400g of fruits & vegetables a day:(5 servings a day) 2) low intake: < 5 servings	NR*	99,2 % (m) 99,3% (f)		NR*	NR*
P6	Pakistan	1990-1994	1) Fruit: daily intake yes/no 2) ghee /butter: daily intake yes/no	NR	13%	NR*		91,8%
P7	Pakistan	1990-1994	1) Fruit: daily intake yes/no 2) ghee /butter: daily intake yes/no	NR	13%	NR*		91,8%
P8	Karachi	2007-2008	1) Fruit & vegetables daily intake	NR*	Normal weight: 80%(f) 78,5% (m) Overweight/obese: 56,5% (f) 66% (m)		NR*	NR*
Migrants (Pakistani Diaspora)								
P9	Oslo	2006-2008	WH panel: 1) 400g of fruits & vegetables a day:(5 servings a day)	NR*	B: 328,9 g /d B: 317,1 g /d	NR*	NR*	NR*
P10	Oslo	2006-2008	Fruit & vegetables intake: small amounts	NR*	44,6% (intervention) 45,3% (control)			
P11	UK	NR*	NR*	NR*	NR*	3,1 (day's p/w)	NR*	NR*
P12	Manchester	1995- 1998	1) 2266 Kcal (WHO recommended intake)	8.8 MJ (M: 2102 Kcal)* 8.3 MJ (F: 982 Kcal)*	NR*	NR*	NR*	86,4g p/d (m) 83,9g (f)
P13	Newcastle	1995-1997	1) Fruit & vegetables daily intake	NR*	90% daily intake		NR*	NR*
P14	Manchester	NR*	1) 2266 Kcal (WHO recommended intake)	8.8 MJ (m:2102Kcal) 8.4MJ (f: 2006)	NR*	NR*	NR*	86g p/d(m) 85g p/d (f)

*NR: not reported

P1: Daily energy intake of 4 different groups (Obese, Overweight, Normal weight & under weight) reported in Kcal.

P2: Daily intake of fruit & vegetables (prevalence) given in 3 different groups. The exact number & percentage of the respondents are reported!

P3: The mean value intake of energy is reported in Kcal & fat in grams.

P4: Lunch (L): vegetables + chapatti.....Diner (D): cooked vegetables + chapatti: prevalence of daily intake of vegetables

P5: Prevalence of fruit & vegetable intake by male (m) and female (f)

P6 & P7: prevalence of daily intake of fruit and fat

P8: Daily intake of fruit and vegetables divided in subgroups: normal weight & overweight/obese and male (m) & female (f)

P9: Intervention study: mean of intake in grams per day at baseline (B)

P10: Intervention study: prevalence data reported by intake in percentage among two groups (intervention & control)

P11: mean of daily intake of vegetables in days per week

P12 & P14: Intake of energy (Kcal) & fat (in grams)

P13: prevalence of daily intake of fruit and vegetables