PAKISTAN JOURNAL OF PUBLIC HEALTH

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The Pak J Public Health accepts articles from both national and international contributors with a special emphasis on research that will have a direct impact on the practice of public health in Pakistan and around the world. The types of articles accepted include original articles, review articles and short communications. Special features will include opinion pieces, letters to the editor, education forum and students corner.

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   Abstracts of original research article should be prepared with a structured format i.e. Introduction/background, objectives, methods, results and discussion/conclusion. Authors must include 4-6 key words. Review article, Case report and other require a short, unstructured abstract. Commentaries do not require abstract. Abstract should not exceed the word limit of 300 words for original articles and the total word count not more than 3000 words, excluding the abstract and references.
   Introduction
   This section should include the purpose of the article. The rationale for the study or observation should be summarized; only strictly pertinent references should be cited; the subject should not be extensively reviewed. Data or conclusions from the work being reported should not be presented.
   Methods
   This section must include the type of study, study population, study area, study duration, details of developing tools for data collection, pre-testing, data collection, plan of analysis, ethical considerations and any other detail deemed necessary to be submitted to support the researchers’ work. References to established methods should be given, including statistical methods; references and brief descriptions for methods that have been published but are not well known should be
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**Results**
These should be presented in a logical sequence in the text, tables, and illustrations. All the data in the tables or illustrations should not be repeated in the text; only important observations should be emphasized or summarized.

**Tables and figures**
Tables and figures should be kept to a minimum. Tables must be comprehensible without reference to the text. References should not be cited in the tables. Authors should indicate at approximately what point in the text the table should appear. Figures, graphs, drawings etc. should not be over complex and must be intelligible when reduced in size for printing. They should be on separate sheets, numbered and with legends. Number tables consecutively in accordance with their appearance in the text. Place footnotes to tables below the table body and indicate them with superscript lowercase letters. Avoid vertical rules. Be sparing in the use of tables and ensure that the data presented in tables do not duplicate results described elsewhere in the article.

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The author's comment on the results, supported with contemporary references, including arguments and analysis of identical work done by other workers. A summary is not required.

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A comprehensive, evidence-based review of the literature relating to an important, major public health area, with a critical analysis and conclusions. The literature review methodology, including databases searched, search terms and dates, should be detailed. Reviews should normally not exceed 4000 words and should include up to three key message points.

**Reviews can be submitted on**
- Public health practice and impact
- Health service effectiveness, management and re-design
- Health protection including control of communicable diseases
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- Critique on public health programs or interventions
- Public health governance, audit and quality
- Public health law
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Manuscripts for publication as Short Reports should be of an overall maximum length of 2000 words, including summary and references. This is equivalent to approximately four printed pages of the Journal. If Tables and/or Figures are included (maximum of one page), the text should be limited to 1500 words. The report should have a short summary, followed by a single text section that is not divided into introduction, results and discussion sections etc. (as in full papers). These should be submitted to the Journal in the same way as full papers (see Submissions).

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SOLID WASTE GENERATION AND SOURCE MINIMIZATION IN URBAN RAWALPINDI, PAKISTAN

Nasir Mahmood¹, Shahzad Ali Khan²

¹District Head Quarter Hospital Rawalpindi, ²Health Services Academy Islamabad (Correspondence to: Mahmood N nasirmahmood8@hotmail.com)

Abstract
Background: Waste has been defined as material with no apparent economic or beneficial value to individuals or societies. Urbanization, industrialization and increased convenience of life have resulted in generation of huge volumes of solid waste in major cities of the world. This study aimed at exploring the household level practices of waste disposal in Rawalpindi city.

Methodology: A mixed method exploratory study was conducted in Rawalpindi. For the quantitative part, a household survey with housewife as respondent in 220 households was done by using a structured questionnaire. Solid waste of household on that particular day was collected and weighed by hand weighing scale. Three focus groups discussions with a group of 5-8 housewives were also conducted for the qualitative part of the study.

Results: The study showed that only 60% households were doing some sort of segregation of solid waste before disposal. Only half of respondents showed satisfaction with solid waste collection and disposal system in Rawalpindi. About 73.2% respondents considered that collection and disposal of solid waste is responsibility of both households and Municipality. About half of the respondents interviewed were willing to reduce household solid waste at source, as well as to give time for voluntary efforts for improvement regarding collection and disposal of solid waste in their areas. Similarly half of the respondents were aware of recycling. Majority respondents knew that there is a relationship between proper solid waste management and health. Significant relationship was noted between education and knowledge of waste minimization and recycling.

Conclusion: As awareness level about the importance of solid waste management is increasing, safe disposal of solid waste can be achieved by increasing community participation in Rawalpindi. (Pak J Public Health 2014; 4(2):1-3)

Key words: Solid waste prevention, household waste, behavior change, assessment of voluntary efforts.

Introduction
Waste has been defined as material with no apparent economic or beneficial value to individuals or societies. Urbanization, industrialization and increased convenience of life have resulted in generation of huge volumes of solid waste in major cities of the world (1, 2). Municipal waste consists of garbage and trash that is generated by households, schools, offices and similar facilities. Municipal waste is classified into solid wastes and waste water or sewage. Solid Wastes is unwanted or discarded waste material from houses, street cleanings, commercial, industrial and agricultural operations. Waste minimization and proper disposal are becoming problem for the municipalities of the major cities and also pose a huge public health concern (3, 4). There is no single method to dispose solid waste and choice of method depends upon local factors like cost and availability of funds, land and labor (5). The existing methods for the disposal of municipal solid waste include processes of dumping, composting, incineration, sanitary landfills and burial (6). Soil associated with waste is a reservoir of microbial life and accumulation of solid waste in man's environment poses health hazard (7, 8).

Pakistan is facing problem of urbanization at a rate of 4% per annum. Most municipal cities in Pakistan are spending 30-40% of municipal budget on solid waste management but their services are unreliable and access is limited, especially in poor localities (9). This inadequacy is partly due to the lack of community involvement, improper technology choices, low resource allocation and institutional weaknesses (10, 11).

Rawalpindi is situated in the northern border of Punjab province. The population of Rawalpindi city in 2011 was estimated to be around 850,000 (12). The City District Government of Rawalpindi (CDGR) is responsible for collection and disposal of solid waste. Amount of solid waste produced in Rawalpindi city is 713 tons per day; 523 tons domestic, 80 tons animal...
waste and 110 tons commercial waste (hospital and industrial waste not included). The private or municipal corporation sweepers collect solid waste from the household, which is transported from narrow lanes of city to municipal drums on wheelbarrows and handcarts. CDGR is only able to collect 40% of solid waste being generated and rest 60% is thrown in open or in drains with major bulk dumped in Naullah Lehi.

**Methodology**

An exploratory study using mixed methodology was conducted in the city of Rawalpindi. Household survey was done by interviewing wife of the head of household as respondent, utilizing a structured tool. The measurement of household solid waste was also conducted. A sample size of 220 households was used for this survey. The city is divided into 77 wards, which are further subdivided into multiple mohallahs. In first stage 10 out of 77 wards of RMC were randomly selected. In second stage two mohallahs out of each ward were selected randomly, and in third stage 11 houses were randomly selected (every third house) in each mohallah. Housewife was interviewed from every 220 households, after taking consent. Complete solid waste of household on that particular day was collected and weighed by hand weighing scale. Two mohallahs were covered every day, with eleven randomly selected households in each.

Qualitative part comprised of focus group discussion. Three focus groups (at three different mohallahs) comprising of 5-8 housewives were also conducted.

**Data Analysis:**

Before data entry into computer all 220 forms were checked for mistakes and omissions. Coding of questions was done at an early stage after sorting out all possible answers. Data was entered in Epi-6 after applying checks. It was then exported into SPSS and analyzed.

The Focus Group Discussions were manually analyzed for domains and taxonomy.

**Results**

**Type of House:** 99.5% respondents were living in Pakka houses; only 0.5% was living in Katcha houses. 71.8% houses were having 2-4 room and 23.2% had more than four rooms and 5% houses had one or two rooms.

**Education:** 37.3% respondents were uneducated; 27.3% were matriculate, 16.8% intermediate, 15.5% graduates and 3.2% were postgraduate.

**Solid Waste Generation:** In 220 households mean weight of waste was 2.076 kg; with a minimum household waste of 0.5 kg and maximum of 6 kg. Waste generated per person in the house was 0.2951 kg/day. **Solid Waste Disposal:** About 64% households were disposing waste through private sanitary workers; 19% through municipality sanitary workers and 10% were throwing their solid waste out. 84% households were paying for collection and disposal of solid waste.

**Waste Minimization:** About 50.9% were willing to reduce solid waste at source, as compared to 49.1% who said that it is not possible.

**Source of Solid Waste:** 84.54% respondents said that kitchen is main source of solid waste generation. 14.1% said children rooms are main source. The amount of solid waste generation increased with increased in household members.

**Recycling and Segregation**

60% houses were doing some sort of segregation before disposal of solid waste. There was statistically significant relation between segregation and education of housewife (P-0.025).

About 58% respondents reported having knowledge of recycling and there was significant relationship of knowledge of recycling and education (P-0.025).

**Results of focus group discussions:**

In all discussions there was consensus that there are few households in every mohallah who throw their waste outside their houses especially at night. There was also consensus that sanitary workers also throw waste outside wherever it is convenient and if they have to go to a far off place to throw the waste.

In all group discussions there was consensus that solid waste has an effect on health of individual and it is breeding place for rats, mosquitoes and flies.

It was noted that segregation of solid waste was common and most participants reported segregating tins, bottles and newspaper, which were later sold. The participants agreed that either they were already paying or were willing to pay for disposal of solid waste from their houses.

**Discussion**

Mean waste generated is 2.07 kg per house is less than reported amount mentioned in other studies in Pakistan. The results of collection disposal of waste practices are similar to other studies, but 84% paying for collection of solid waste is higher than reported in other research studies. The results that only 60% houses were doing some sort of segregation of solid waste before disposal are similar to other studies. Barriers to engaging household in waste minimization include both modern consumer culture and a genuine confusion that waste prevention is equivalent to recycling. We must not leave
recycling to network of garbage collectors, sorters and scavengers who have no support from official authority and whose incentives are for financial gains. A significant relationship between education and knowledge of recycling highlights the importance of education for healthy lifestyle. Half of the respondents with willingness to reduce and recycle their solid waste and ready to undertake voluntary efforts for improvement regarding collection and disposal of solid waste are positive findings.

Conclusion
People are now becoming aware of linkage between proper waste disposal and health; and are even willing to pay for solid waste collection and disposal. Solid waste segregation and minimization at source can be achieved through raising awareness and mobilizing local communities.

Recommendations
Local committees should be formed to solve waste problems at local level. Reuse and waste minimization at the house hold level should be encouraged; paper bags use should be encouraged instead of plastic shoppers, and those involved in re-use of solid waste in a commercial setup should be patronized. School teachers should be involved in order to give health education to children as well as their parents.

References
PERCEIVED PRACTICES OF HARASSMENT IN NURSES AT THEIR WORK PLACE IN PUBLIC & PRIVATE HEALTH SECTOR OF ISLAMABAD, PAKISTAN

Bushra Lubna¹, Huma Qureshi², Ramesh Kumar¹, Aijaz Ali¹, Shahzad Ali Khan¹, Mudassar Mushtaq Jawad Abbasi⁶

¹Alumni Health Services Academy, Government of Pakistan, Islamabad, ²Pakistan Medical Research Council Islamabad, ³³⁴⁵⁶Health Services Academy, Government of Pakistan, Islamabad, (Correspondence to Kumar R: ramesh@hsa.edu.pk)

Abstract

Introduction: Violence at workplace has been recognized in all sectors, but those sectors in which females are working in larger numbers such as health and social services are at high potential particular risk. The aim of the study was to determine the factors influencing their perception about harassment so the overall social status of nurses should be improved. In general nursing harassment among public health professionals at public and private sectors of Islamabad.

Methods: The cross sectional study was conducted among 300 participants. Reliable self-administered questionnaires were used to collect the data after taking the ethical consideration to collect data from the participants. Data was then analyzed using statistical software SPSS 17.0.

Results: The results showed during this survey mostly 63% respondents replied that they were verbal harassment during their working conditions, while some 17% observed physical harassment, few 16% were observed bullying and only 4% were observed the sexual harassment. A low level of association between Nurses sexually harassed. Most of participants were harassed but not recognized that is harassment and consider routine job problems which have no solution except quietness. There was no association between harassment and socio demographic characteristics. Variables such as type of harassment and type of harasser and types of overcome the situation ware found to be significantly influencing significant result found that only low level of the participants found to be known about the policy and more over they are not aware to respond or procedure of proper incident recording of harassment although there is internal hospital policy exists. No Proper awareness about harassment it policy and their record of incident can effect motivation and work but also career decisions, rapport writing, relations with others and personal wellbeing.

Conclusion: Those who are working in a nursing profession that is extremely on high risk of all kind of harassment. Sometime this situation cause feelings of uncertainty and reduced interest in nurse's job. Harassment less conducive environment essential part of ensuring high quality output for hospital. Harassed Nursing staff give poor quality, less efficient output for the organization. Interventions need to be implemented in order to reduce level of harassment among public and private hospitals of Pakistan. (Pak J Public Health 2014; 4(2):4-7)

Keywords: Nurses harassment, bullying, physical violence, work place environment and health professional.

Introduction

Predominance of Harassment or violence is now recognized as a major health priority by the World Health Organization (WHO), the International Council of Nurses, and Public Services International. Even so, the number of nursing personnel affected by this problem continues to augment (1). Government of Pakistan has recently amended a law on protection against sexual harassment of women at their workplace in 2010. Similarly the harassment against nurses is very high (2). Threats and violence are issues mutually on a social level and in public health settings. The nurse occupation is associated with an especially high risk of being exposed harassment at work. Occurrence of physical violence from members of the public and non-physical harassment from colleagues is more prominent in the health-care staff and can be harmful to both staff and clients or patients that ultimately influence health care delivery system. While policy has tended the center of attention on the more observable problem of public violence, these factors are still undetermined (3). The WHO states that workplace violence includes both physical and psychological aspects. Workplace violence in this study refers to 'incidents where staff are abused, threatened or assaulted in circumstances related to their work, including commuting during work, involving an explicit or implicit challenge to their protection, comfort and health. The effects of workplace
violence can include their work performance, physical injuries and psychological trauma. While researchers have reported high frequencies of workplace violence in the hospitals of Taiwan, these studies have focused on physical violence but have not described fully its psychological harm (4). Violence in Emergency Department nurses is highly common. Precipitating factors to violent incidents identified by respondents is consistent with the research literature; however, there is considerable potential to mitigate these factors (5). The general ward and direct interaction with patients were common risk factors for each type of workplace violence including the sexual harassment (1).

**Methods**
A descriptive cross-sectional study was conducted to assess the level of harassment and determine the factors influencing work place harassment among nursing professionals in public and private sector of Islamabad. Study was conducted from April 22nd to July 20th, 2012, ethical clearance was obtained from the internal Review Board of Health Services Academy (HSA). Each hospital were selected randomly and nurses working in these settings were approached for interview on adopted, pretested, validated and reliable tool after taking the written consent. The sample size was estimated and 300 nurses were approached accordingly by the trained data collectors and were interviewed. However, 15 nurses refused to give any information making the refusal rate 5%. Nurses having debilitating illness, T.B, Asthma, mental disability were excluded. The nurses were identified and approached through the administration of the concerned hospitals. Data was analyzed by using SPSS version 17 and univariate analysis was done using "Chi square" test for all the categorical variables.

**Results**
Total 300 participants were included in this study, their mean age was 20 years and majority 78% were belong to age group of 20-29 years. Most of the nurses 86% were initial level health workers having the working experience less than 5 years. There were equal representations of the study participants both from public and private hospitals. With regards to professional qualification, a major number 57% of the respondents were General Nursing and midwifery, 33% were BSN, and 2% were nursing students and 8% with other qualification. Majority 75% participants were single, while 22% were married.

Surprisingly, almost all the nursing staff has been facing some type of harassment during their work place. These types of harassment may be physical, verbal, bullying and sexual. During this survey mostly63% respondents replied that they were observed verbal harassment during their working conditions, while some 17% observed physical harassment, few 16% were observed bullying and only 4% were observed the sexual harassment. Table 1 shows that the frequency of harasser in different kind of harassment.

<table>
<thead>
<tr>
<th>Harasser</th>
<th>Physical attack N=39</th>
<th>Verbal abuse N=145</th>
<th>Bullying N=38</th>
<th>Sexual harassment N=9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient/client Management / supervisor</td>
<td>9</td>
<td>66</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>Relatives of patient/client</td>
<td>10</td>
<td>103</td>
<td>19</td>
<td>0</td>
</tr>
<tr>
<td>Outsider</td>
<td>9</td>
<td>6</td>
<td>12</td>
<td>5</td>
</tr>
<tr>
<td>Staff member</td>
<td>4</td>
<td>107</td>
<td>9</td>
<td>2</td>
</tr>
<tr>
<td>Worker</td>
<td>4</td>
<td>7</td>
<td>7</td>
<td>2</td>
</tr>
</tbody>
</table>

When asked about the reporting of harassment, majority 106 took no action against verbal abuse. Majority 104 told the person to stop against verbal abuse. Mostly 74 told the family about incidence against verbal abuse, 5 against physical attack, and 12 against bullying and 3 against sexual harassment. Some 81 told to colleague against bullying abuse, 70 against verbal abuse, 7 against physical abuse and 4 against sexual harassment. While 2 persons reported to the police regarding physical abuse. Respondents did not respond on: worker transferred to another position; sought help from association and completed incident form. When compare in Public and Private sector in different types of harassment then it is found that there is highly significant association (table 2).

<table>
<thead>
<tr>
<th>Hospital</th>
<th>Physical harassment</th>
<th>p-value</th>
<th>Verbal harassment</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
<td>don't know</td>
<td></td>
</tr>
<tr>
<td>Private</td>
<td>13</td>
<td>108</td>
<td>29</td>
<td>29.28</td>
</tr>
<tr>
<td>Public</td>
<td>4</td>
<td>82</td>
<td>62</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>17</td>
<td>190</td>
<td>91</td>
<td>0.00</td>
</tr>
<tr>
<td>Bullied</td>
<td>1</td>
<td>119</td>
<td>29</td>
<td>21.19</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>84</td>
<td>64</td>
<td>92</td>
</tr>
<tr>
<td>Total</td>
<td>2</td>
<td>203</td>
<td>93</td>
<td>0.00</td>
</tr>
</tbody>
</table>

Result also shows that there was significant association has been found in the qualification and type of harassment like verbal, bullying and sexual harassment with p value of less than 0.05, while in physical harassment there is no any significant association reported with p value more than 0.05. Nursing Qualification has some relation with the different type of harassment in physical Harassment; nurses are in diploma course harassed 10% the harassment. Harassment is less in BScN program but there is no Physical harassment in student nurses p
value is also not significant, In verbal harassment account 50% and highest in the diploma holder nurses 27% and lesser in BSC nurses and only 2 student nurses are harassed verbally and power of the study is high among the Qualification and the verbal harassment. Harassment is in both of the sector has a meaningful result as more 24 nurses accept that they are physically abused and only 15 out of 300 accept they are harassed. But they is no significant result found in physical harassment. Harassment is in both of the sector has a meaningful result as 88 nurses (29%) accept that they are verbally abused and only 57 out of 300 (30%) accept they are harassed. They is significant result found in verbal harassment and the power of the study is also highest.

Discussion
Physical Harassment was reported more among nurses in private sector as compared to public sector. Nurses of private sector are being more physically harassed more frequently then the public sector (6). One of the reasons could be that they are more vocal and independent of sharing their views. Another factor could be the type of clients which private sectors’ nurses deal with, as evidence majority of the harasser were patients and their relatives. Few were harassed by the staff members, health care worker and outsiders. Most of the time client visiting private sector belongs to upper class of the society, who wants to express as authoritarian as compare to public sector where the patients belong to poor or lower or middle class of the society. Other factors for the high percentage of harassment in private sector could be the attitude. Study shows that there could be a reason for not reporting the event were fright of negative penalty, threats, and embarrassment for reporting about harasser most of the time (7). Nurses who were physically harassed were general nurses. The reason could be is the majority of the nurses were not trained to cope with the difficult situation. Nurses at their workplace have also not given the basic training on how to deal with the harassment situation. Another influence could be qualification or they are more expressive in their thoughts. Most of the nurses who were facing this harassment were belong to younger age group. The reason could of high prevalence is that there is a high group of nurses representing this age group.

Verbal abuse was also reported more in private sector hospital. Reason could be the good reporting from private sector and the nurses are more open to express them self, interesting thing is the maximum harassment done by the staff members, the relative, patients and outsider. Literature shows verbal Harassment has psychological problems, it was identified by one of the study where nurses were asked General Health Questionnaire from nurses. It was found that Workplace violence in the health workers is mainly underreported. Nurses are also very hesitant to report about any harassment from coworkers or superiors. verbal abuse can create the same level of mental distress for victims as compare to physical harassment or even more severe consequences (6). Another Indian study showed that the verbal harassment/abuse is more common in women at their work place (8). As qualification has strong positive relation with harassment. The reason of verbal harassment in the general nursing and the BscN could be that they are feel frank and good reporting the verbal abuse. They do not feel guilty and there is no threat for them to report the abuse. Nurses are the main source of communicating the result with everyone around the patient so the express more and while talking they might think that they are being verbally abused. The lesser harassment in the student are because their limited representation in the study. Bullying was more common in public sector hospitals as compare to private. Reason could be the good reporting from public sector and the nurses are more interactive to all kind of general public. They showed positive response while asking about bullied. The maximum harassment done by the relative of the patients followed by the outsider abuse and then staff members. All nurses harassed were with the qualification of general nursing and midwifery qualification. The reason could be the majority of the nurses were belong to public sector and they have more frequent interaction with all hospital as well as patients. As there are less staff in the public hospital and they have more patients to look after and over burden become the stress for them and ultimately resulted into bullied. More over it is being discussed that they are not trained for such kind of situations. Major reason could of high prevalence is that there is a high moral and respect seeking behavior in this age where a person represent and known good reputation and if it does not get then may be resulted in bullied. Sexual Harassment was reported more in public sector than private hospital. Reason could be the good reporting from public sector and the nurses are more interactive to all kind of general public. Over all lesser number for the support of the sexual harassment is might be the feeling of guilt and shame they showed no realistic response while filling the self administered questionnaires. Another reason that this result could disturb their personal and professional life: may be their married life, their children or supervisor may take any response, more over the fear of harasser is the big challenge to them. They are reluctant of sharing the true information; they think that sharing might break the confidentiality that if somebody comes to know that they are part of such kind of harassment. Sexual harassment is so crucial in working environment is the Supreme Court guidelines have opened up the discourse on sexual harassment at the workplace, it is clear that much remains to be done to
address gender stereotyping and harassment in the working environment and to ensure that women have recourse to effective resolution of complaints. It is important for example, that awareness of the inappropriateness of sexual harassment and the rights of women workers is created and worked into the conduct rules for employees at all levels, irrespective of their positions. More specifically, there is a need to raise awareness of high the Supreme Court guidelines and to build confidence among women workers that complaints made will be treated impartially and confidentially.

References


Awareness of Risk Factors Regarding Ischemic Heart Diseases, Among the General Population of Rawalpindi and Islamabad

Shehroze Hasnain, Tayyab Waseem, Usman Tariq, Shakeel Yousaf, Muhammad Ahmed Abdullah

1-5 Shifa College of Medicine, Shifa Tameer-e-Millat University, Islamabad (Correspondence to Abdullah MA: drahmedabdullah83@gmail.com)

Abstract

Introduction: Previous studies have been conducted in Pakistan, ascertaining the burden of risk factors for IHD prevalent within our population. However, many of these studies have not assessed the knowledge of the populace about IHD and the risk factors precipitating to this deadly condition. Thus the purpose of this study is to assess the level of understanding within the public in terms of what IHD means, its effects on health and the risk factors that lead to this disease. The objective of this research was to determine the degree of awareness about Ischemic heart disease (IHD) and its associated risk factors among the general population of Rawalpindi and Islamabad.

Methodology: One hundred and fifty nine individuals were chosen for the study based on non-probability accidental sampling technique. Data was gathered via a semi-structured questionnaire and results were assessed via SPSS (Statistical Product and Service Solution 21.0).

Results: Mean age of respondents was 36, 43.4% had basic knowledge of ischemic heart disease, 9.9% considered there was a relationship between IHD and smoking, 9.1% considered cholesterol as a risk factor, but majority considered being overweight and having increased stress levels leads to IHD (82.5% and 80.9% respectively).

Conclusion: The compilation of our results determined the lack of awareness among the general population of Islamabad and Rawalpindi about IHD and its corresponding risk factors; especially among those who carried potent hazards of the disease. Among those who did have some awareness, concerning modifiable risk factors such as smoking, exercise and stress, did not take precautions in reducing such risks. This calls for an extensive public awareness campaign about IHD and its contributory factors. (Pak J Public Health 2014; 4(2):8-11)

Keywords: Awareness, Risk Factors, Ischemic Heart Diseases, Rawalpindi and Islamabad

Introduction

Ischemic heart disease (IHD) is the leading cause of death worldwide with a percentage of 7.2 % casualties per annum (1). In a global phenomenon, Pakistan ranks 17th in the list of casualties from IHD with a death rate of 229.2 per 100,000 (2). Pondering over these astronomical morbidity figures related to IHD, it is a major cause of concern that the general population is still not fully aware of the risk factors pertaining to this particular disease (3,4,5). Furthermore, the Asian populace is more vulnerable to IHDs (6,7). Due to lack of awareness, mainly in such an area of developing countries, economic burden of curative treatments are exceptionally high, accounting for 60% of the health care management expenses. Additionally, the statistics projected that the number of affecters of coronary heart disease would increase from 47 million disability-adjusted life years (DALYs) globally in 1990 to 82 million DALYs in 2020 (8).

Awareness about risk factors is an important prerequisite for a person, to be able to make life style modifications for disease prevention, control and therapy. In Pakistan, where resources and infrastructure employed in providing effective medical care are scarce, having awareness of risk factors for IHD development seems to pivotal in controlling the mortality rate of the disease.

Methodology

This study is based on a mixed-method research design that was performed in two locales, namely Shifa International Hospital, Pitar Bukhari Road, Sector H-8 (Islamabad) and Tayyab Poly Clinic, 5 MamuJee Road, Lalkurti (Rawalpindi), between August 2013 and March 2014. The OPD settings of the above hospitals were used as a population set and a non-probability accidental sampling technique was used to select 159 individuals who would then take part in our study. These individuals were approached by two teams of interviewers, each comprising of two medical students, without making any prior distinction about that individual's health status, i.e. patient, attendant or
otherwise. This practice was performed simultaneously in both locales, alternatively by both teams. This research was approved by the Shifa Medical College, Ethics Committee.

Each respondent approached for selection in this study was first given a brief overview about the purpose of the research and was questioned about his/her willingness to answer a few questions. Their concern for discretion, regarding their names, contact numbers, address and quality of their answers, was met by assuring them about our positions as medical students. Privacy was further guaranteed by telling respondents that answering questions that inquired about their personal information were not mandatory.

We collected data by circulating semi-structured questionnaires among those who agreed to participate. The questionnaire was initially structured in English by one interviewer and subsequently translated into two different Urdu versions by two other members in our research team. Discrepancies in both forms were determined and omitted to form a single Urdu-based questionnaire by the fourth member of our study group. The credibility of our questionnaire, in terms of simplicity and authenticity of the inquiries within, was then assessed by distributing 10 questionnaires each among workers of Shifa International Hospital, such as sweepers, security guards and key keepers. Their queries and response to questions were assessed and further incongruities were removed from the questionnaire. The final form was circulated among our respondents. Enough time was given to each respondent to finish answering the questionnaires. Those who were unable to read or write, yet agreed to become a part of the study were asked questions verbally and their exact answers in Urdu were documented on the questionnaire.

Data was collected by determining answers to the questions and was assessed via the SPSS (Statistical Product and Service Solution 21.0).

Results
Basic demographics:
The respondents were divided into four class intervals according to age. 24% were in the age group of 15-25 years, 34% respondents belonged to the interval of 26-35 years while 16.3% were in the interval of 36-45 years, and 25.7% were above the age of 45 years. The respondents were also inquired about their respective occupation, with 20.4% being students, 12.7% housewives, 48.4% in private/government sectors and 18.5% belonging to other fields. The ratio of married to single came out to be 67.7% to 31.6% respectively with 0.6% of the respondents being divorced.

Knowledge about ischemic heart disease and its causes:
The respondents were asked if they had any basic knowledge regarding IHD, out of our sample size of 159, 43.4% gave a positive response with 55.3% having no knowledge and 1.3% were not sure if they had the correct understanding. When further asked to elaborate their degree of awareness we found out that 11.6% of the respondents had the correct basic knowledge of IHD, whereas 58.4% had heard about the disease but were unable to explain their answers, and 30% had made mere incorrect assumptions. When asked about the leading causes of IHD, 18.9% respondents labeled smoking as the major cause, 19.6% believed high fat intake and cholesterol is the major cause, 20.9% mentioned other causes which included lack of exercise, high blood pressure and increased stress levels and the remaining 40.6% were unaware of the causes.

Knowledge and trends regarding major risk factors of IHD:
Respondents were questioned concerning smoking, 81.1% respondents were non-smokers and 18.9% were regular smokers, out of which 58.1% smoked less than 10 cigarettes and the remaining 41.9% smoked greater than 10 cigarettes per day. 55.3% of the respondents were aware of the detrimental effects of smoking and 74% were also aware of the hazards of passive smoking. When asked about the relationship of smoking and IHD 9.9% had sound knowledge, 16% had some idea and 8.6% of the respondents believed it has no association. The next risk factor investigated was cholesterol. Among the respondents 67.3% had basic knowledge of what it is but a staggering 79.1% were aware that it is somehow harmful to health, 45.9% were even able to identify different foods containing cholesterol. 9.1% of the participants were also able to explain how cholesterol can lead to ischemic heart disease. Furthermore we inquired about the relationship of weight and IHD, 80.1% of the respondents believed that being overweight causes damaging effects on health and 83.4% knew there is an established relationship between being overweight and IHD. When asked about balanced diet 67.1% of the respondents had knowledge of what a balanced diet is and 82.9% were aware how dietary habits are linked to heart diseases. Awareness regarding relationship of some other risk factors such as, positive family history, comorbidities (diabetes and hypertension) and increased stress levels, with IHD was also asked from the respondents the statistics of affirmative replies were 56.6%, 50.9%, 75.5% and 80.5 % respectively.

Summary regarding knowledge of association of different risk factors and IHD are given in Table 1.
Our questionnaire was also aimed to assess the practices of the respondents regarding routine dietary habits and an overview of their lifestyle. The respondents were questioned about their respective weight in Kg; the results were then divided into equal class intervals. 24.8% of the respondents fell into the interval of 40-60 Kg, 59.3% were in the interval of 60-80 Kg, and 40.7% were above 80 kg. 15.1% of the total respondents even had thorough knowledge of body mass index and 42.4% considered regular exercise is the best method for weight regulation but only 28.9% maintained a regular habit of exercising. Regarding dietary habits, 35.2% of the respondents reported a regular intake (1-2 times a week) of fruits and vegetables and 72% expressed that they consume moderate or high amounts of salt in their diet. 34.6% even had their cholesterol levels tested previously.

Discussion

In our study, 43.4% of the individuals stated that they knew about IHD while 55.3% were impervious to the term. Those who stated in the affirmative were further probed about the degree of information that they had concerning the disease and its risk factors, which showed that only 11.6% of those individuals had accurate information. This finding proved monumental in serving the purpose of our study while highlighting the staggering deficit of information among the masses about IHD and its associated endangering causes.

Shahid Abbas et al. also found that the burden of heart disease was more common in males than females, in both urban and rural populations (9). In our study, 72.3% of the respondents were males, out which only 38.26% knew about IHD and the associated risk factors while an overwhelming 61.74% did not know about the illness. Interestingly, out of the 27.7% of the females in our study sample, 56.81% females knew about IHD and its associating factors. This showed that although males bare the major brunt of IHD, females are more aware of this ailment.

Shahid Abbas et al. also found that 49.09% of males (sum of different age groups) living in urban areas smoked cigarette whereas our study determined 18.86% of the study sample smoked cigarettes. Not surprisingly, all these individuals were males. Out of this small percentage of smokers in our sample, 53.4% had never been counseled by a doctor about the ill effects of smoking or its relationship with IHD. Furthermore, an overwhelming 56.67% of smokers did not even know about the association between smoking and heart disease. This lack of knowledge was surprising because those who smoke 20 cigarettes or more per day have a relative risk of 4.46 to die at the age of 45 years due to smoking-related heart diseases. In our study, 40% of the smokers did not know about the detrimental effects their smoking habit had on those around them, which is a worrying discovery considering that the relative risk of IHD in passive smokers is 1.30 (10).

In Pakistan, prevalence of diabetes stood at 12.9 million with an estimated 38 million pre-diabetic individuals (11). Despite the large burden of this disease, we found that 44.45% diabetics in our study were not aware of the relationship between diabetes and IHD. This was again worrisome because the relative risk of developing IHD in diabetic women is 1.8 and in diabetic men is 3.3 (12). Moreover, although 65.4% of the individuals pointed out a preventive role of exercise in development of IHD, only 28.98% of the respondents actually exercised. Of those who did exercise, only 15.1% knew about BMI and its ideal range.

Our study also focused on the presence of non-quantifiable risk factors such as stress and family history in derangement of normal heart function. 80.5% individuals stated that there existed a directly proportional relationship between stress and IHD. In a previous study a positive relationship was determined between stress and IHD, where the odds of having been exposed to highly stressful environments was 2.59-3.60 more in new IHD patients (13). Karin Leander et al. determined that the odds of having a positive family history for IHD were 2.00 times more in patients with IHD (14). 56.6% of the respondents acknowledged an association between IHD and family history of the disease, while 43.4% of the individuals did not site family history as an important precipitating factor in the development of IHD.

<table>
<thead>
<tr>
<th>Practices and attitude of the general population:</th>
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<tbody>
<tr>
<td>Our questionnaire was also aimed to assess the</td>
</tr>
<tr>
<td>practices of the respondents regarding routine</td>
</tr>
<tr>
<td>dietary habits and an overview of their lifestyle.</td>
</tr>
<tr>
<td>The respondents were questioned about their respective weight in Kg; the results were then divided into equal class intervals. 24.8% of the respondents fell into the interval of 40-60 Kg, 59.3% were in the interval of 60-80 Kg, and 40.7% were above 80 kg. 15.1% of the total respondents even had thorough knowledge of body mass index and 42.4% considered regular exercise is the best method for weight regulation but only 28.9% maintained a regular habit of exercising. Regarding dietary habits, 35.2% of the respondents reported a regular intake (1-2 times a week) of fruits and vegetables and 72% expressed that they consume moderate or high amounts of salt in their diet. 34.6% even had their cholesterol levels tested previously.</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Table 1: Summary regarding knowledge of association of different risk factors and IHD</th>
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<tbody>
<tr>
<td>1 Smoking</td>
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<tr>
<td>2 Cholesterol</td>
</tr>
<tr>
<td>3 Overweight</td>
</tr>
<tr>
<td>4 Family history</td>
</tr>
<tr>
<td>5 Comorbidities</td>
</tr>
<tr>
<td>6 Increased stress levels</td>
</tr>
<tr>
<td>Percentage</td>
</tr>
<tr>
<td>-9.9%</td>
</tr>
<tr>
<td>-9.1%</td>
</tr>
<tr>
<td>-82.9%</td>
</tr>
<tr>
<td>-56.6%</td>
</tr>
<tr>
<td>-50.9%</td>
</tr>
<tr>
<td>-80.5%</td>
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</table>
Conclusion
Findings of our study determined the presence of risk factors and awareness associated with the disease. An important finding was that many individuals did not know about IHD and its causative factors. Furthermore, of those who had the risk factors, many did not know about their role in causing heart diseases. This shows a lack of penetration of medical knowledge within the general population, especially concerning modifiable risk factors such as smoking, stress and sedentary lifestyle. Based on our findings, a public awareness programme needs to be conducted on a wide scale to reduce burden of heart diseases in Islamabad and Rawalpindi.

References
3. Knowledge of Coronary Artery Disease (CAD) risk factors and Coronary Intervention among University Students Aysha Almas, Aamir Hameed, Fateh Ali Tipoo Sultan
POPULATION IMMUNITY AGAINST POLIO: A CASE STUDY FROM AJK

Tariq Mahmood Mughal¹, Ehtisham ul haq², Amjad Mahmood khan³, Asghar Ali⁴, Tayyab Ilyas⁵

¹²³⁴⁵Divisional Head Quarter Hospital Mirpur AJK, ²DHQ Hospital Mirpur, ³Allama Iqbal Open University Islamabad
(Corresponding to Mughal TM: tariqlabs@gmail.com)

Abstract

Introduction: Fortune is one step ahead to the objective lay down in 1988 towards eradicating Polio Globally. Polio is seized to 3 countries from 125 countries and 1 strain from 3 strains in 1988. Pakistan is one of the three endemic courtiers had 60% raise in Polio cases while Afghanistan and Nigeria decline 62% and 57% Polio cases respectively in 2013 (1). With the present rise of Polio cases in Pakistan and retransmission threat to many countries particularly from Pakistan, Polio eradication program in Pakistan need to be rebranded. As a part of this initiative, Immunization threshold against Polio is assessed in AJK (Azad Jammu and Kashmir), on the basis of number of OPV (Oral Polio Vaccine) doses received by AFP cases during routine EPI (Expanded Program on Immunization) and SIAs (Supplemental Immunization activities). AJK interrupted Wild Polio Virus circulation 14 years back and maintained the epidemiological status ever since.

Methodology: Retrospective review of three years data for routine EPI reported by the Health Department AJK and NIDs (National Immunization Days) assessed coverage then is compared with OPV doses for both routine and NIDs recorded in non Polio AFP (Acute flaccid Paralysis) cases reported during 2013-2011.

Results: Data analysis showed assessed (assessed by WHO through third party) coverage of NIDs and OPV3 coverage reported by the Health Department of AJK is very close to the number of OPV doses received during NID and OPV3 coverage through routine EPI recorded in a non Polio AFP cases reported during study period.

Conclusion: Data analysis shows satisfactory age matched OPV doses received by non Polio AFP cases reported from all the districts of AJK during 2011-2013. Study shows vital population immunity level against Polio in AJK perhaps is the only reason for maintaining interrupted WPV circulation since 2000. So it is correct that increased level of immunity is very essential for eradicating Polio and reaching every child is the only approach. (Pak J Public Health 2014; 4(2):12-15)

Key words: Polio, Eradication, Immunity level, AJK

Introduction

GPEI (Global Polio Eradication Initiative) had the mammoth achievement of 99% success by decreasing 350,000 Polio cases since 1988 to 406 in 2013, and from 125 endemic countries to 3 endemic countries and from 3 strains of Polio Virus to only one strain exists in 2014 (2). With the Polio free certification of SEAR (South East Asia Region) on March 2014, 80% of population in the world is living in Polio free regions now.

Earlier World health assembly in 1988 adopted the goal of eradicating polio by the end of 2000 and this goal was reaffirmed at the World Summit for Children in New York, 1990. The PEI timeline aimed at stopping polio virus transmission in 2000 containment of the wild polio virus by 2002, certification of global eradication by 2005 and stopping all OPV immunization from 2005 - 2010 (3).

There was a ray of hope for GPEI (Global Polio Eradication Initiative) in 2013 when Pakistan reported 58 Wild Polio cases confirmed by Lab and surveillance process and quality indicators were meeting international criteria, furthermore number of environmental sampling sites increased and wild Polio virus isolation from environmental sample decreased considerably (4).

Failing on the way to interrupt Wild Polio Virus circulation continues in 2014. There are many reasons to the failure but on the whole in spite of political reassurance and documented (NEAP) "National Emergency Action Plan" for Polio free Pakistan, casualness win through countryside from federal to districts level.

Pakistan is among the three endemic countries which had a raised number of Wild Polio cases to 60% in 2013 and almost 400% raised by the end of the 21st week in 2014 as compared to same period in 2013 (5). This study is carried out in AJK keeping in view the alarming situation of Wild Polio Virus transmission and global retransmission threat from Pakistan. Main objective of this effort is to analyze the immunization
threshold among non Polio AFP cases notified during the study period by calculating number of OPV doses received by the cases and recorded in the districts line list.

**Methodology**

Retrospective review of three years data for the number of OPV doses received during both NID and routine EPI recorded in non Polio AFP cases reported during 2013-2011. Target was to calculate OPV3 doses in age 6-59 months during routine EPI, while ≥3 OPV doses in age 0-59 months age during SIAs. Data collected from line list maintained by Provincial Office of EPI manager for AJK. Cases were included in the study, which were reported and taken on line list from all the 10 districts of AJK during the study period.

Furthermore, % of non Polio AFP cases received OPV doses during SIAs compared with NIDs assessed coverage (assessed by the third party) of the respective district and OPV3 coverage reported by the Health department AJK at district level is compared with % of non Polio AFP cases received OPV3 coverage recorded in the line list during the study period.

Number of OPV doses received by the AFP cases recorded on the basis of parents' recall which can only be verified by going through children immunization cards. Majority of the parents either misplaced the immunization cards or couldn’t bring along at the time of the clinical examination of the AFP cases. To overcome the bias of parents' recall, immunization status of the AFP cases are verified through NIDs coverage assessed by the third party throughout the year. Whereas the percentage of AFP cases received OPV3 verified through the OPV3 coverage reported by the Health Department at the districts level.

**Study Period:** Duration of the study period is from 2013-2011 retrospectively.

Inclusion Criteria: Non Polio AFP cases reported by the districts of AJK, included in the line list maintained by the AJK Provincial Office of EPI manager during the study period.

**Results**

Keeping in view the epidemiological status of AJK and frequent travel of people to and from the AJK from endemic areas of the country, there is an increased risk of indigenous Wild Polio Virus being reintroduced in the area. Three years (2013-11) data is reviewed to compare NIDs assessed coverage with the NID doses received by the non-Polio AFP cases. Four NID rounds are conducted in AJK each year. Geometric mean of all four rounds taken for each year and then compared with the percentage of NID doses received by the non Polio AFP cases reported during the same year in AJK (table: 2).

Geometric means of four rounds of NID in 2011 is 98.37% as compared to NID doses received by non Polio AFP cases are 90%. Geometric means of assessed coverage of NID rounds was 97% for both the years 2012 and 2013 as compared to 90% of non Polio AFP cases received ≥3 NID doses during 2012 and 2013 (table1).

<table>
<thead>
<tr>
<th>Years</th>
<th>1st round</th>
<th>2nd round</th>
<th>3rd round</th>
<th>4th round</th>
<th>Geometric means of NID Coverage (%)</th>
<th>Number of Non Polio AFP cases reported (n)</th>
<th>≥3 NID OPV doses in aged 6-59 months in Non-Polio AFP cases (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013</td>
<td>97</td>
<td>96</td>
<td>97</td>
<td>97</td>
<td>96.75</td>
<td>50</td>
<td>90</td>
</tr>
<tr>
<td>2012</td>
<td>98</td>
<td>97</td>
<td>97</td>
<td>96.5</td>
<td>97.12</td>
<td>34</td>
<td>90</td>
</tr>
<tr>
<td>2011</td>
<td>99</td>
<td>98</td>
<td>99</td>
<td>97.5</td>
<td>98.37</td>
<td>44</td>
<td>90</td>
</tr>
</tbody>
</table>

Reported OPV3 coverage for the years 2011-2013 compared with the percentage of non Polio AFP cases received OPV3 during this study period. OPV coverage reported in 2011, 2012 was 100% as compared to 98% and 100 AFP cases received OPV3 in 2011 and 2012 respectively, while 99% OPV3 coverage reported by health department in 2013 as compared to 90% coverage of OPV3 recorded in AFP cases during 2013 (table2).

<table>
<thead>
<tr>
<th>Years</th>
<th>Reported OPV3 coverage %</th>
<th>OPV3 doses in % of Non Polo AFP cases age 6-59 monts</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td>100</td>
<td>98</td>
</tr>
<tr>
<td>2012</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>2013</td>
<td>99</td>
<td>90</td>
</tr>
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</table>

Table 3: Median age compared with number of NID doses in NPAFP cases.

<table>
<thead>
<tr>
<th>Year</th>
<th>Median age in months</th>
<th>OPV doses in non-polio AFP cases 0-59 months age</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013</td>
<td>43</td>
<td>13</td>
</tr>
<tr>
<td>2012</td>
<td>32</td>
<td>11</td>
</tr>
<tr>
<td>2011</td>
<td>43</td>
<td>13</td>
</tr>
</tbody>
</table>
Median age of non Polio AFP cases calculated and compared with mean OPV doses received as shown in table 3. During 2013 mean OPV doses calculated for 43 months median age, 11 OPV doses recorded for 37 month median age in 2012 and 2011 median age recorded 43 months and mean OPV doses received were found 13.

Discussion
Eradication requires high levels of population immunity in all areas of country over a long-standing period with adequate surveillance in place [6]. In-progress circumstances of Polio Eradication Program in Pakistan, AJK is the only geographical area which has maintained the epidemiological status of interrupted Wild polio virus circulation for last 14 years.

Four Strategies were adopted to eradicate Polio from the world, which includes Immunization campaigns, AFP Surveillance, Mop up and strengthening of routine EPI. In the polio eradication strategies immunization is the most important activity to achieve the target. Three out of four activities were focussing on immunization performance and surveillance is also to keep an eye on the epidemiology of virus and prompt notification of the virus so that immunization activities can be focused to stop the virus circulation first and then wipe out the virus from the pocket.

Eradication is probably an ideal goal for an immunization programme; to date only smallpox has been eradicated, allowing discontinuation of routine smallpox immunization globally. The next disease targeted for eradication was polio, which is still a global challenge (7). Although high coverage with oral polio vaccine (OPV) has eliminated type 2 polio virus globally, transmission of type 1 continues in limited areas in three countries whereas last case of type 3 reported from FATA (Pakistan) in 2012 (8).

OPV was selected to eradicate Polio keeping in view the global experience of Polio eradication. One dose of OPV generates protection to polio virus in more or less 50% of the recipients. Three doses produce immunity in more than 95% of receiver and immunity is long-lasting and probably lifetime (9). WHO recommended three dose strategy for endemic countries during routine EPI and additional SIA (Supplemental Immunization Activities) Which includes (NID)National Immunization Days, SNID (Special National Immunization days), Mop up as a case Response activities and SIADS (Short Interval Additional Dose Strategy) is recently introduced to immunize <5 years children in high risk areas within Pakistan. OPV produces excellent intestinal immunity as well, which helps prevent infection with wild Polio virus. Serological studies have shown that sero conversion following three doses of OPV is nearly 100% (10).

This study result shows generally immunization coverage against Polio in AJK is satisfactory for recommended immunization schedule for both routine EPI and NID Campaigns coverage. Number of studies and Global Polio eradication experience confirm OPV coverage above threshold level provide both solid immunity and effectiveness against infection transmission (11). OPV produces excellent intestinal immunity as well, which helps prevent infection with wild Polio virus. Serological studies have shown that sero conversion following three doses of OPV is nearly 100% (10). Perhaps this may be the reason that AJK has interrupted Polio Virus circulation 14 years back and maintained the epidemiological status since then.

Conclusions
Study results show satisfactory age matched OPV doses received by non Polio AFP cases reported during 2013-2011 in AJK. Global Polio eradication experience and number of studies are evident that serious conversion following three doses of OPV is almost 100%. OPV coverage meeting the threshold level perhaps is the reason for maintaining interrupted WPV circulation since 2000 in AJK. So it is acceptable that increased level of immunity is very essential for eradicating Polio and reaching every child is the only approach, this is the basics of eradication.

To overcome the barriers of eradicating Polio from Pakistan can be through rebranding the initiative with the concept that advantage of an immunization is more than just prevention of an illness in individuals. Vaccination basically saves a poor man from huge loss of resources which he can put in acquiring other basic needs. Reducing vaccine preventable deaths and morbidity also help out Pakistan in achieving MDG (Millennium Development Goals) and in turn reduce poverty.

References


EXPLORING β-GLUCAN ACTIVITIES WITH XYLOGLUCANASE AS HYDROLYTIC ENZYME, ANTI TUMOR AND ANTI INFECTANT THROUGH MOLECULAR DOCKING STUDIES

Sidrah Hamidani¹, Maimoona Abid², Asma Sana¹, Salman Nawaz², Nadeem Hassan³, Fauzia Yusuf⁶

¹Health Services Academy, Islamabad  ²COMSATS Institute of Information Technology Islamabad. ³Advisor Biosciences dept. COMSATS Institute of Information Technology Islamabad. (Correspondence to Sana A: asma_sanasial@yahoo.com)

Abstract

**Introduction:** β-glucan is a polysaccharide that is a major component of fungal cell wall. Xyloglucanases, which is an endo-hydrolytic enzyme, hydrolyzes glycosidic bonds, thus degrading polysaccharides into oligosaccharides. It can hydrolyze the β-glucan of fungal cell walls, making β-glucan capable of performing anti-tumor and anti-infective activity. β-glucan is also recognized by immune system as non-self molecules, thereby inducing various innate and adaptive immune responses. Thus, the entry of β-glucan in host system initiates defense strategies to encounter fungal infections. Therefore, to explore the interactions of Xyloglucanases and β-glucan, molecular docking study was performed. This study attempts to perceive the mode of binding of β-glucan on chain A and chain B with Xyloglucanases.

**Methods:** Taking Xyloglucanases as receptor and β-glucan as ligand, molecular docking was performed with two subunits and three subunits of β-glucan. Individual dockings of chain A with two subunit and three subunit ligand respectively; and of chain B with two subunit and three subunit ligand respectively; was conducted.

**Results:** The docking analysis revealed that the ligand β-glucan binds exactly on the binding cleft of Xyloglucanases. Considering all the four dockings performed, the best interaction was chosen of Xyloglucanases chain B with three subunit ligand, by examining the binding energies of the dockings conducted. Furthermore, the binding residues were also analyzed. Residue VAL52 plays the most critical role for H-bond interaction, whereas TRP98, HIS97, SER36, ASN51, and TRP53 make extensive van der Waal and hydrophobic contacts. A region of aromatic amino acids also appears to play an important role in binding of ligand.

**Conclusion:** Therefore, the interaction of Xyloglucanases with β-glucan can provide useful insights into the formation of stable Xyloglucanases-β-glucan complex that can perform anti-fungal activity, role in enhancement of biopesticides and different biological activities which are beneficial for the humans. (Pak J Public Health 2014; 4(2): 16-21)

**Keywords:** Molecular docking, xyloglucanases, β-glucan, anti tumor activity, anti infectant.
types of glucanases: β-glucanases and β-glucanases. Xyloglucanase is a type of β-glucanases. It is a polysaccharide degrading enzyme, which is basically an endo-hydrolytic enzyme responsible for cleaving the beta-(1-4)-glycosidic linkages. It helps in degrading xyloglucan and glucans (5). Xyloglucanases is involved in mycorrhizal symbiosis. Biochemical studies have shown that there is involvement of fungal hydrolytic enzymes in the process of roots colonization. Various experiments have also shown that Xyloglucanases has higher activity in mycorrhizal plants than other hydrolytic enzymes such as pectinases and cellulases (6).

Xyloglucanases can degrade β-glucan by breaking the glycosidic bond. Hydrolyzed β-glucan can kill the fungus which will help reduce the propensity of fungal infections in humans as well as plants, as hydrolyzed β-glucan has some major advantageous functions, for instance, it has an anti-bacterial activity (7), anti-viral activity (8) as well as anti-fungal activity (9). Besides this β-glucan is a potential immunomodulator.

As the cell wall of fungi protects it from various environmental stresses, it can be well understood that its structural components can be recognized by innate immune system (11). The innate ability to detect non-self particles is necessary for the survival of multicellular organisms. This is achieved through evolution of germ-line encoded receptors which can recognize foreign substances by "pattern recognition receptors" (PRRs). These receptors identify molecules that are associated with groups of pathogens unknown to host, known as "pathogen-associated molecular patterns" (PAMPs). PAMPs include lipopolysaccharides (LPS), lipoteichoic acid (LTA) and peptidoglycan of bacteria; and β-glucan of fungi (10). Thus, the identification of (1, 3) β-glucans as a non self particle indicated the presence of certain receptors in innate immune system that recognize β-glucan and triggers defense activities against it. Xyloglucanases is specific enzyme for glucans, mainly xyloglucans and β-glucans. Experimental studies have proven that hydrolysis caused by Xyloglucanases results in increased amount of glucose monomers (13). The current study attempts to find the mode of binding of Xyloglucanases with (1, 3) β-glucan by in silico molecular docking studies. The purpose is to hunt putative active hydrolytic sites of Xyloglucanases responsible for hydrolyzing (1, 3) β-glucan, as well as to study the mode of hydrolysis, how the docking complex would be productive enough to give a stable binding complex and also exploring the interactions involved between Xyloglucanases and (1, 3) β-glucan. This research paper aims to study the formation of a stable complex that can offer maximum biopesticidal activity, to produce healthy crops and to enhance the hydrolysis of β-glucan to degrade fungal cell wall and stimulate immune responses against fungal, bacterial or viral infections.

**Methods**

Structure retrieval, drawing and Active site finding

The 3D structure of Xyloglucanases was obtained from PDB server having PDB ID 2JEM. The 3D structure of (1, 3) β-glucan was not available in PDB, so it was drawn using its chemical formula C18H32O16. For the detection of binding pockets in receptor molecule Pocket-Finder was used.

**Molecular docking using AutoDock**

Molecular docking was performed using AutoDock 4.2, available at the website http://autodock.scripps.edu/. The receptor was kept rigid with ligand flexible at 17 rotatable bonds. Only polar hydrogen's were then added in protein. As the ligand is not protein, Gasteiger charges were added to it. The rigid roots of the ligand were detected automatically. Then a grid was set on the possible binding sites of the receptor. The grid box was set at 50, 50, 56 Å (x, y, and z), and the grid centre - 7.856, 38.756, and 28.28 x, y and z coordinates. The spacing between grid points was set at 0.866 angstroms. The Lamarckian Genetic Algorithm (LGA) was chosen to search for the best conformers, with following search parameters setting: number of Genetic Algorithm (GA) runs set to 100; population size 15; and maximum number of energy evaluation was 2500000; maximum number of generations 27000; and RMS Cluster tolerance set to 2.0Å. All the AutoDock docking were performed on Intel (R) Core(TM) 2 Duo CPU T5750 @ 2.00GHz 2.0GHz with 4.00GB Memory (RAM).

Root mean square deviation (RMSD) cluster analysis along with binding free energy comparative analysis was performed to identify the best docking complexes. AutoDock results were further examined by detail analysis of the best docking conformation achieved on the best run. The binding site was located looking at the residues involved in binding the receptor with the ligand. The types of interactions (H bond, van der Waals, electrostatic) and bonds formed between the ligand and receptor was also explored. Chimera 1.5.3 (http://www.cgl.ucsf.edu/chimera/) was used for further detailed analysis of the docking conformations, examining the binding pocket, generating images, interacting residues visualization, and for the depiction of docking results.

**Results**

**Receptor and Ligand Identification:**

The selected receptor Xyloglucanases having PDB of 2JEM is an endo-beta-1,4-glucanase, derived from Bacillus licheniformis. Xyloglucanases is a specific enzyme capable of catalyzing the solubilisation of polysaccharide into oligosaccharides, it cleaves the beta-1, 4-glycosidic linkages. The major function of Xyloglucanases is the hydrolysis and degradation of...
cellulose and polysaccharide. It has two chains A and B; both are identical but have different orientation and binding sites.

**Active Site finding:**
Pocket finder detected 10 probable sites for binding of ligand to the target protein. Each of the sites is represented in different color. Site 1 was predicted as best because of its large size and presence in the core region. Moreover some of the residues of site 1 were similar to those that were already reported in literature to have an important part in substrate binding. The most possible sites in chain A and B is shown in Figure 1.

**Docking Results:**
Xyloglucanases consist of two chains A and B. For the docking analysis both the chains were docked separately with the ligand to get the most favorable docking results. Firstly, docking of two subunits of β-glucan with chain A of Xyloglucanases was performed and then similarly with chain B for 100 rounds of docking conformation. Subsequently, docking of three subunit β-glucan with both chains of xyloglucanses was done individually. The best conformation was selected on the basis of AutoDock RMSD cluster ranking and lowest binding free energy of the protein-ligand complex. For further analysis Chimera 1.5.3 was also used.

Detailed analysis of each of docking process is explained individually. The best docking chosen is of Chain B with three subunit ligand because of its lowest binding energy free energy.

**Evaluation and Comparison of docking results:**
The best results are evaluated on the basis of energy difference and RMSD (Cluster and Reference). Following are the evaluated results: Best binding model was identified by analyzing binding free energy evaluation. AutoDock estimates the energies in Kcal/mol for final intermolecular energy (vdW+Hbond +desolv energy, electrostatic energy), Final Intermolecular Energy, torsional free energy, and Unbound System’s Energy. The detailed study for each ligand-chain interaction was carried out and the list of energy information for each ligand-chain is tabulated in Table 1.

![Figure 1](image1.png)

**Figure 1** Probable sites for binding of ligand on the receptor: The site with highest binding probability is shown in blue labeled as site 1. (A) Chain A and (B) Chain B.

![Figure 2](image2.png)

**Figure 2:** Full Docking conformation: Compact binding of three subunit (1,3) β-glucan (yellow) within the cleft of the xyloglucanases chain B (sea green) is clearly visible.

<table>
<thead>
<tr>
<th>Receptor</th>
<th>Ligand</th>
<th>Interacting residues</th>
<th>Binding energy kcal/mol</th>
<th>Intermolecular energy kcal/mol</th>
<th>Total Internal Energy kcal/mol</th>
<th>Inhibition Constant nm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chain A</td>
<td>2 subunit</td>
<td>TRP53, LSN51, HIS97, TRP99</td>
<td>-4.79</td>
<td>-4.89</td>
<td>-2.64</td>
<td>0.00</td>
</tr>
<tr>
<td>Chain A</td>
<td>3 subunit</td>
<td>TRP53, TRP148, HIS97, ALA197, TRP99, LYS195, TRP197</td>
<td>-5.96</td>
<td>-5.68</td>
<td>-4.94</td>
<td>0.00</td>
</tr>
<tr>
<td>Chain B</td>
<td>2 subunit</td>
<td>TRP53, TRP99, HIS97, PHE49, SER36, ASN51, VAL52</td>
<td>-5.96</td>
<td>-5.50</td>
<td>-4.94</td>
<td>0.00</td>
</tr>
<tr>
<td>Chain B</td>
<td>3 subunit</td>
<td>TRP53, HIS97, SER36, ASN51, TRP53, VAL52</td>
<td>-6.38</td>
<td>-6.44</td>
<td>-3.21</td>
<td>0.00</td>
</tr>
</tbody>
</table>
Figure 3 Focused views showing only the near residues of receptor bound with the ligand β-glucan (yellow). The close association of the residues is quite visible. Interacting residues are depicted in bond form while the ligand is shown in solid surf surface form. TRP98 (blue), HIS97 (magenta), SER 36 (purple), ASN51 (red), VAL 51 (green) and TRP 53 (blue) are efficiently involved in binding.

Higher amount of energy release is a sign of a highly stable complex formation. The role of residues involved in binding the receptor to the ligand is also important in achieving an intact complex. The binding residues involved are TRP53, TRP98, HIS97, ASN51, VAL52, and SER36. The binding of successive residues interacting with β-glucan is shown in Figure 4. It can be observed from Table 1 that tryptophan residues are constant among all the four dockings performed. TRP53 and TRP98 are hence an active component responsible for holding together the receptor and ligand molecule by van der Waals forces. Histidine helps in enzyme catalysed reaction while asparagine and serine covalently binds with the carbohydrates, and undergo electrostatic interactions with the ligand. VAL52 makes three hydrogen bonds with β-glucan, of bond lengths 3.256, 2.535 and 2.022 angstroms, shown in Figure 4.

Figure 4 Hydrogen bonding: Illustrating ligand (yellow) in bond form with the receptor (sgreen) as ribbons. VAL52 (green) of receptor forms hydrogen bonds with the ligand encircled in red.
VAL52 to further stabilize the interaction. The most unique feature of beta glucan and Xyloglucanases complex is the presence of polar or non polar aromatic residues TRP98 and TRP53. TRP residues make the Non polar aromatic residues at position 98 and 53. A region of aromatic amino acids appears to play an important role in binding of ligand. SER36 and ASN51 form polar acyclic neutral residues and the VAL52 makes the non polar acyclic aliphatic region. The binding residues TRP98 TRP53 and VAL52 makes hydrophobic region of the binding site and the HIS97 SER36 and ASN51 makes the hydrophilic region. Xyloglucanases β-glucan complex can offer a wide spectrum antifungal activity in agricultural fields, for instance, it can be used as a biopesticide. As biopesticides are made from naturally occurring microorganism, bacterial organism producing Xyloglucanases can be used for manufacturing these biopesticides, and used in agricultural fields to protect plants from fungal infections. Xyloglucanases can degrade β-glucan by hydrolysis into small oligosaccharides, which then allows β-glucan to perform its anti-tumor, anti-infective activity as well as stimulate immune responses(12); the application of this biopesticide will protect the field from fungal pathogen attack. As some fungi act as parasites and pathogens, they can attack cultivated plants damaging their roots, causing plants to wilt and die. Some disease causing fungi, for example, rice blast fungus Magnaporthe oryzae, late blight of potato caused by Phytophthora infestans, southern corn blight, caused by Drechslera maydis, cause extensive damage and losses to agriculture fields (11). To prevent crops from disastrous effects of fungus, this biopesticide can be proposed to be used as an antifungal source to protect plants.

Application of this will not be hazardous when these crops will be used as a food source because of the presence of β-glucan. The fungal cell wall mainly contains carbohydrates, in particular chitin, glucan and other oligosaccharides that are present on cell wall glycoproteins. Besides their structural role in fungal cells, many of these components participate actively in host-fungus interactions. In fact several of them are immuno-active molecules that can trigger and modulate the host immune response and are crucially involved in fungal growth and virulence (12). (1,3) β-glucan located in the cell wall of fungus and bacteria, has its receptors in the host, namely, Dectin 1, CR3, lactosylceramide and scavenger receptors, that allows the host to recognize fungal pathogens (9). In case of any fungal attack to the host, the defense system activates immediately, and stimulates immune responses either by triggering the production of natural killer cell, neutrophils, or by endocytosis and phagocytosis, or by the induction of chemokines or cytokines (13). Thus, β-glucan plays a major role in activating the host immune system and subsequently playing a substantial role in protecting the host by being anti-infective, anti-carcinogenic, anti-tumor substance. Thus intake of it will instigate instant immune responses and protect the host from any harmful effects.

**Conclusion**

In this study molecular docking and dynamics studies have been performed to explore the binding mechanism of the hydrolytic enzyme Xyloglucanases and the polysaccharide β-glucan. We determined the energetically favored docking sites for the β-glucan. Our docking results explain that the chain B of the receptor is the most favorable region in which ligand is bound to the receptor because of its best docking energy of -6.38. In this study, the hydrogen bond majorly contributes to the interactions between ligand and enzyme. It is evident that VAL52 plays an important role in the strong interaction of ligand with the receptor. Besides hydrogen bonding, van der Waals interactions were also taking part in the stabilizations of the interaction, residues such as TRP98, HIS 97, SER36, ASN51 and TRP53. The interaction of these two molecules will help in the enhanced hydrolysis of β-glucan. The hydrolyzed β-glucan will help in the efficacy of biopesticides. A major growth area for biopesticides is in the area of seed treatments and soil amendments. As the hydrolyzed β-glucan kill the fungus on the crops. So, the uptake of these crops in human will play a critical role in protective innate immune responses against fungal infections and potentiate host response against variety of conditions, including tumor development and fungal, bacterial or viral pathogens.

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ASSESSMENT OF CHANGE IN QUALITY OF LIFE PARAMETERS (SF-36, FLANAGAN) WITH TREATMENT IN PATIENTS WITH IRON-DEFICIENCY ANAEMIA

Amjad Mehmood¹, Abdul Qayum², Tariq Mahmood Mughal³, Arshd Qureshi⁴ Tariq Masood¹, Sardar Majeed Khan⁵, Ehtisham ul Haq⁶

¹Department of Medicine, Mohtarma Benazir Bhuto Shaheed (MBBS) Medical College, ²Clatterbridge Hospital, Liverpool, UK, ³Department of Pathology, Mohtarma Benazir Bhuto Shaheed (MBBS) Medical College, ⁴Department of Surgery, Mohtarma Benazir Bhuto Shaheed (MBBS) Medical College, ⁵Department of Radiology, Mohtarma Benazir Bhuto Shaheed (MBBS) Medical College, ⁶DHQ Hospital Mirpur AJK. (Correspondence to: Haq EU drehtisham@gmail.com)

Abstract

Introduction: The study was carried out to quantitatively assess the effect of the disease on quality of life (QoL) of patients with iron-deficiency anaemia (IDA), and also the change in QoL scores with treatment. We carried out a prospective study to explore the effect of anaemia on quality of life (QoL), and whether the treatment helps to improve QoL.

Methods: The patients with confirmed iron-deficiency anaemia were included in the study. Blood was analysed for full blood count, mean corpuscular volume, haemoglobin (Hb), ferritin, transferrin, transferrin saturation, and microscopic analysis of the blood film. Iron deficiency was defined if these parameters fell outside local reference values. The patients with background chronic illness, cancer and pregnancy were excluded from the study. A total of 128 patients were included in the study. The treatment was carried out by oral ferrous sulphate. QoL scores were estimated according to two scoring systems; SF-36 and Flanagan QoL score. All patients treated with iron were reviewed at three months to assess response to their treatment allocation. Response to the treatment was defined as full (Hb rise of more than 2 g/dL), partial (Hb rise of 1-1.9 g/dL), or no response (Hb change of less than 1 g/dL). Iron stores were assessed with a repeat ferritin level. Patients with a full or partial response to oral iron were continued on this treatment.

Results: The generalized total SF-36 score prior to and after treatment was compared and considerable difference found. Pre-treatment Flanagan score was estimated to be 50±4.9, which increased to 70.6±4.08 after treatment. The compliance to treatment was 100%. The compliance to adherence to in-time attendance for QoL protocol was 100%.

Conclusions: The results have shown a beneficial effect of treatment on QoL and underlines the necessity of substitution treatment at earlier stages even if symptoms are not compelling. (Pak J Public Health 2014; 4(2):22-27)

Key-words: Iron deficiency anaemia, quality of life, asymptomatic iron deficiency, Flanagan score, SF-36 score

Introduction

Nutritional deficiencies are common, both in developing and developed worlds. Anaemia is one of the consequences of nutritional deficiencies. In fact iron-deficiency is the most common cause of anaemia worldwide, comparison 75-80% of the total burden of anaemia's (1). Nutritional anaemia is particularly common in populations with less organized health systems. Previously it was found that overall, more than one fifth of women in Pakistan, suffered from anaemia (2). The major risk groups for IDA are young children, adolescent females, women of reproductive age, pregnant and lactating women. Other causes of significance include poor nutrition, pregnancy, menstrual disorders, fibroids, abortion, GI bleeding, worm infestation, blood diseases, piles etc (3). IDA is not limited to female population, but affects patients of old age and up to 50-60% of young children. With growing population and an increase in poverty indicators, the problem of nutritional deficiencies including iron-deficiency anaemia is likely to increase in magnitude. For this reason, various aspects of the problem should be regarded as priority research area.

The treatment of IDA is aimed at improvement in haemoglobin to alleviate symptoms. The treatment of mild to moderate anaemia is given less importance, particularly in terms of improvement in quality of life. Anaemia can have a significant effect on health care requirements and expenditures (4). Quality of life (QoL) measures have become a vital and often required part of health outcome appraisal. For populations with other chronic diseases, measurement of QoL provides a
meaningful way to determine the impact of healthcare. It was shown that QoL and cognitive function are impaired in patients with anaemia that is associated with chronic renal failure (5,6). Anaemia is associated with disability and decreased physical performance and muscle strength in the elderly (7). It can also lead to more serious complications, such as cardiovascular and neurological impairments, and may increase mortality, independently of race or gender (8,9). Quality of life is impaired in persons with anaemia and produces a high level of fatigue (10). These observations require meticulous check on QoL parameters in patients with anaemia and to confirm that the treatment has desired effect on QoL. Given the almost universal recommendation of guideline panels, the rationale for treatment of anaemia cannot rest solely on the reduction of the need for blood transfusion, although this is certainly important. The other real issue is improvement in quality of life.

The Flanagan QoL scale was initially developed in the United States during the 1970’s to measure the quality of life in a sample of 3000 American adults. The original QoL score contained 15 items representing five conceptual domains of QOL: physical and material well-being, relationships with other people, social and civic activities, personal development, and recreation. The modified version, depicted in Fig 1 and used in the present study, includes 16 items and found to be better (11).

The SF-36 is a widely used, validated, generic health-related QOL questionnaire consisting of 36 items that form 2 components: physical and psychological (12). The physical aspect of health comprises physical functioning, role-physical, bodily pain, and vitality, and the psychological aspect of health is composed of role-emotional, social functioning, and mental health. The overall schema of SF-36 is shown in Fig 2. The items refer to perceived health status during the last 4 weeks. Responses are transformed to a score of 0-100 where a higher score represents a better QoL within that sub-section. The SF-36 was used as it covers relevant domains of function and well-being, and most of the items in SF-36 are considered to have good sensitivity and responsiveness (13).

Patients and Methods
The study was conducted at District Headquarter Teaching Hospital, Mirpur, AJK. Ethical approval for the study was granted by the Ethical & Verification Committee. Informed consent was obtained from all participants of the study. The selection criteria included decrease in haemoglobin to less than reference range in an adult patient. Exclusion criteria included pregnant females, underlying chronic illness, age less than 18 years or more than 65 years, patients with cancer or presence of co-morbidity which could affect QoL.

Blood was analysed for full blood count, haemoglobin, mean corpuscular volume, ferritin, transferrin, transferrin saturation, and microscopic analysis of the blood film. Iron deficiency was defined if these parameters fell outside local reference values.

Patients having haemoglobin levels >10 g/dL were prescribed oral ferrous sulfate at a dose of 525 mg, equivalent to 106 mg of elemental iron, per day, after the principal meal. Compliance with therapy was confirmed by interrogation. Oral iron-intolerant patients were treated with intravenous treatment. All patients with haemoglobin less than 8 g/dL were also initially treated with intravenous iron (Venofer, 5 mL - 100 mg iron
sucrose), at a dose of 200 mg twice a week. Iron sucrose doses were diluted in 100 mL isotonic sodium chloride and then given as a continuous intravenous infusion for about 30 minutes. The intravenous iron requirement for patients was individually calculated according to Ganzoni’s formula: total iron deficit (mg) - [body weight (kg) x (target haemoglobin -actual haemoglobin g/dL) x 0.24] + 500 (14).

The primary end point was a change in QoL. Secondary end points were a change in haemoglobin and hematologic parameters.

All patients treated with iron were reviewed at three months to assess response to their treatment. The following definitions were used to grade the Hb response to treatment. An increase of more than 2 g/dL was a significant response, 1 to 2 g/dL was a moderate response, 0.5 to 1.0 g/dL was a slight response, <0.5 to 0.5 g/dL was defined as no change, and a fall of .0.5 g/dL was defined as a decrease. Iron stores were assessed with a repeat ferritin level. Patients with a full or partial response to oral iron were continued on this treatment. Patients with no response to oral iron were offered treatment with intravenous iron sucrose.

To precede with the SF36 measurements in our patients, we reformatted the questionnaire to render it more user-friendly style without modifying the content of the original questions.

Statistical analysis

For continuous variables, mean and standard deviations were calculated. For categorical variables, percentages (and 95% confidence intervals [CI]) were provided. Quantitative variables were compared with the Student’s t-test for paired data. A P-value < 0.05 was considered statistically significant. Multiple linear regression analysis was performed to study the correlation between basal haemoglobin concentrations and basal quality-of-life score.

Results

A total of 128 cases were enrolled. More women (71.7%) than men (28.3%) presented with anaemia. Female to male ratio was 2.5:1. There was gender-related difference in age distribution. The mean age at presentation was 54±4.8 and 45.5±7.3 years in men and women, respectively. This is depicted in Fig 3. The mean haemoglobin was 8.9±1.2 g/dL with the range being 5-11 g/dL. The mean MCV and RDW were 53.4±9.9 fl and 30.2±5.2pg, respectively.

Fig 3.  The box plots show the mean age of the male and female subgroups of anaemic patients. The bars show standard error

The compliance to the study protocol and treatment was 100%. Initial QoL score were haemoglobin-depandant. This is shown in Fig 4 for Flanagan QoL scores. Most of the patients with Hb more than 10 scored more than 55.

Fig 4.  Flanagan QoL scores, shown on Y axis, before treatment as related to initial haemoglobin, shown on X axis.

There was significant increase in Flanagan QoL score with treatment. Initial mean Flanagan score before treatment was 50±4.9, which increased to 70.6±4.08 (Fig 5). Independent sample t-test was highly significant, the p-value being <0.005.
SF-36 scoring showed more elaborative analysis. Fig 6 and Fig 7 graphically depict SF-36 scores.

Table 1: The table shows the mean ± SE scores of QoL sub-categories, before and after three months of treatment. The percent of increase in score is also shown.

<table>
<thead>
<tr>
<th>Category</th>
<th>Before Treatment</th>
<th>After Treatment</th>
<th>% Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical Functioning</td>
<td>51±23</td>
<td>75.4±18</td>
<td>47%</td>
</tr>
<tr>
<td>Role Physical</td>
<td>35±37</td>
<td>62.9±30</td>
<td>79%</td>
</tr>
<tr>
<td>Bodily Pain</td>
<td>68±21</td>
<td>85.7±13</td>
<td>26%</td>
</tr>
<tr>
<td>Health</td>
<td>31.3±16</td>
<td>65±8</td>
<td>109%</td>
</tr>
<tr>
<td>Mental</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vitality</td>
<td>29±17</td>
<td>64.5±8</td>
<td>122%</td>
</tr>
<tr>
<td>Social</td>
<td>47±18</td>
<td>63±10</td>
<td>34%</td>
</tr>
<tr>
<td>Role Emotional</td>
<td>39.6±40</td>
<td>64.3±30</td>
<td>62%</td>
</tr>
<tr>
<td>Mental Health</td>
<td>56.5±15</td>
<td>64±18</td>
<td>13%</td>
</tr>
</tbody>
</table>
Discussion
It is important to remember that, besides the change in haemoglobin levels, the primary therapeutic goal is to improve quality of life of the patients. In terms of QoL, patients would adapt to low haemoglobin levels if anaemia developed slowly. This explains the concept of "asymptomatic" anaemia. In truth, the term "asymptomatic" reflects the fact that deteriorations in physical condition, quality of life, and cognitive function may pass unrecognized by both patients and their doctors. Therefore, the process of adaptation to chronic anaemia would be, in fact, adaptation to lower quality of life. Previous studies have shown that improvement in anaemia leads to improved QoL parameters. The highest improvement in the quality of life is observed precisely when the haemoglobin levels increase from 11 to 13 g/dL (15).

The deterioration in QoL has various consequences. For example, anaemia occurs commonly in the elderly in association with impaired physical performance (4,7). The development of anaemia in elderly is commonly associated with resultant morbidities such as falls, weakness, and immobility. The epidemiologic literature is replete with data linking anaemia with frailty, functional impairment, mobility impairment, and falls in older persons (16). In 5 trials among cancer patients on and off chemotherapy, an increase in haemoglobin concentration was associated with improvements in fatigue, which, in turn, was associated with improved physical, functional, emotional, and overall well-being (17). Other studies confirm that treatment of anaemia and an increase in haemoglobin improves concentration, quality of life, and may decrease even mortality (18). These observations emphasize the need to diagnose, measure and record changes in QoL to confirm the treatment effect and to prevent complications secondary to decreased QoL parameters.

In past, attempts have been made to design and use various QoL parameters. SF-36 and Flanagan QoL scores are in wide use in epidemiological studies. Their utility has been shown in various chronic conditions. The individual components of the SF-36 quality-of-life score correlate directly with the haemoglobin concentration in all measures except pain (19). In a meta-analysis of the patients with anaemia, a consistent and significant positive correlation has been shown between change in haematocrit and change in adjusted health-related quality-of-life score (20). Over the ensuing 20 years, several researchers have used the 16-item English language adapted version of the QOLS as well as translations of the QOLS to gather quantitative QOL information from people with chronic illnesses and healthy samples. These illnesses include diabetes mellitus, osteoarthritis, and post-ostomy surgery patients, rheumatoid arthritis and systemic Lupus erythematosus, chronic obstructive pulmonary disease, psoriasis, heart disease, and low back pain (21-24).

Present study is probably the first of its kind on a population of patients with purely iron-deficiency anaemia. The patients in our study did not suffer from any other condition which could contribute to deteriorated QoL. The results regarding gender distribution are consistent with previous observation and show female predominance. Our results have yielded that both QoL scoring systems were effective in demonstration of changes in QoL parameters. However, SF-36 scores were better to outline changes in separate components of QoL.

The results of present study clearly outline the need for treatment of anaemia, even mild one. The need for detection and treatment arises, not to prevent blood transfusions and to correct "blood picture", but to improve QoL and prevent complications such as falls, impaired cognition and dementia. This is even more important in countries where nutritional deficiencies are prevalent and "sub-clinical" nutritional anaemia is likely to remain un-treated. In fact, the necessity of treatment of these sub-clinical cases is more than medical, its all about quality of life (25).

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DETERMINATION OF INSECTICIDE SUSCEPTIBILITY/RESISTANCE STATUS OF ANOPHELINE MOSQUITOES IN DISTRICT MIRPUR AJ&K

Saima Batool¹, Imtinan Akram Khan², Soaib Ali Hassan³, Aijaz Ali⁴, Saima Hamid⁵, Samina Naeem Khalid⁶

¹-⁶Health Services Academy, Islamabad (Correspondence to Batool S: saima_batool@hotmail.com)

Abstract

Background: The lack of baseline data and status of susceptibility/susceptibility of insecticide in Anopheline mosquitoes in district Mirpur AJK.

Method: Species were identified by using standard taxonomic keys. These studies were carried out during the Year 2013 from district Mirpur AJK. For the determination of insecticide susceptibility/resistance status use the WHO recommended test kits.

Results: The primary vector of malaria in AJ&K is Anopheles culicifacies and An. stephensi but the proportion of An. culicifacies was high as compared to An. stephensi. Susceptibility test were conducted on primary and suspected malaria vector in AJK by using WHO recommended susceptibility/resistance test kit and following guide line Insecticide impregnated papers with diagnostic dose of 4% DDT, 5% malathion 0.05% lambdacyhalothrin 0.05% deltamethrin and 0.75% permethrin according to WHO interpretation.

Conclusion: Resistance/Susceptibility status of Anopheles mosquitoes has not yet established in Mirpur district so this study will provide baseline data on Resistance/Susceptibility status of Anopheles. This was the preliminary survey of insecticide resistance/susceptibility of Anopheles species in District Mirpur. Insecticide resistance was observed in malaria vector species An. culicifacies against 4% DDT, 5% malathion 0.05% lambdacyhalothrin 0.05% deltamethrin and 0.75% Permethrin according to WHO interpretation. This survey generates record of different species of Anopheles in the district Mirpur. It provide evidence base data on insecticide resistance, which enable to follow trends in susceptibility status in this area and will also serve as a base for resistance management interventions. In view of the present status of the resistance in disease vector, the development and implementation of comparatively new strategies for integrated vector management (IVM), needs to be planned in light of the data of this study. (Pak J Public Health 2014; 4(2):28-32)

Key words: Anopheles, Malaria, Susceptibility status of malaria vector, Integrated vector management.

Introduction

Malaria is a major global health problem. The estimated 247 million malaria cases with almost half of the global population at risk and nearly a million deaths each year (1). Among the 109 malaria endemic countries, India had 1.5 million confirmed malaria cases in 2009 with over 1,000 deaths (2).

In 2012 there are 99 countries and territories with ongoing malaria transmission and 5 countries in the prevention of reintroduction phase, making a total of 104 countries and territories in which malaria is presently considered endemic. Standard reporting forms were sent in March 2012 to the 99 countries with ongoing malaria transmission and two countries that recently entered the prevention of reintroduction phase. Information was requested on: (i) populations at risk, (ii) vector species, (iii) number of cases, admissions and deaths for each parasite species, (iv) completeness of outpatient reporting, (v) policy implementation, (vi) commodities distributed and interventions undertaken, (vii) results of household surveys, and (viii)malaria financing. Malaria is an entirely preventable and treatable disease, provided the currently recommended interventions are properly implemented. These include (i) vector control through the use of insecticide-treated nets (ITNs), indoor residual spraying (IRS) and, in some specific settings, larval control, (ii) chemoprevention for the most vulnerable populations, particularly pregnant women and infants, (iii) confirmation of malaria diagnosis through microscopy or rapid diagnostic tests (RDTs) for every suspected case, and (iv) timely treatment with appropriate antimalarial medicines (according to the parasite species and any documented drug resistance) (3).

In the Eastern Mediterranean Region Pakistan, Somalia, Sudan and Yemen Where as in the South-East...
Asia Region, Bangladesh, India, Indonesia and Myanmar have persistently high malaria burden. In 2010, four countries accounted for 97% of the confirmed cases which were Sudan (58%), Pakistan (22%), Yemen (10%) and Afghanistan (6%) (4).

Malaria is the second most prevalent and devastating disease in Pakistan. Malaria has a tendency for epidemic. Outbreaks over larger area, particularly in Baluchistan, NWFP and Sindh province. However, the disease is now emerging as a prominent health problem in FATA particularly along the international border with Iran and Afghanistan. In 2011, the total number of confirmed malaria cases in Pakistan (public sector), reported from all the districts were 319,592 (5).

Vector control is an important part of the global malaria control strategy. In malaria control, insecticides are used for treatment of mosquito’s nets and other material, for indoor residual spraying, or as larvicides. Pyrethroid insecticides are increasingly important for these purposes, but have limited use as larvicides. This is in addition to their extensive use as agricultural and household pesticides. Development of vector resistance to these insecticides will lead to a problem in their uses. Despite limited monitoring of insects in the field, vector resistance including multiple resistances covering all four major classes of insecticides has been reported in some important malaria vectors (6). Insecticide resistance monitoring is an integral part of vector/public health pest control programs. Knowledge of vector/pest susceptibility to pesticides, changing trends of resistance and their operational implications are basic requirements to guide pesticide use in vector-borne disease and pest control programme (7).

In Pakistan malaria still remains a major threat to the health of millions. The burden has been estimated to be as high as 1.6 million cases annually [8]. Prevalence of malaria in Afghan refugees in Pakistan is higher than in the local population [9].

There are two primary malaria vectors in Pakistan An. stephensi and An. culicifacies who have developed resistance to insecticide of chlorinated hydrocarbon group such as DDT and dieldrin in neighboring countries such as Iran, Afghanistan, Iraq, Saudi Arabia, India resistance to DDT and this species developed resistance to malathion in Iran [10]. Indoor residual spray (IRS) was the only strategy implemented in Pakistan since 1950's for vector control [11]. The present malaria vector control program in Pakistan, is to follow Roll back malaria (RBM) strategy and the main approach, based on integrated vector control (IVC), which is selective focal indoor residual spraying, larviciding and use of bednets (12). DDT was the first insecticide effectively used for the control of vector mosquitoes from 1952-1974. In addition to its killing effect DDT also created irritant effect and derived out mosquitoes from sprayed premises and thus reduced man-vector contact (13). In 1974 DDT was replaced by BHC/dieldrin but the vector population became resistant to them. In 1976 malathion (organophosphate) was first introduced in Punjab province. Susceptibility status of vector population was surveyed in 1980 and malathion resistance was discovered in An. stephensi in district Lahore (14).

In the light of these results other districts of Punjab were also surveyed such as susceptibilities of six anopheline mosquito species from nine localities in Punjab Province to DDT, dieldrin, malathion, fenitrothion, fenthion and propoxur were determined. DDT-resistance was found in An. annularis, An. culicifacies, An. stephensi and An. subpictus but An. nigerimus and An. pulcherrimus were susceptible to DDT. Association between DDT-resistance and endophilic habit of the mosquitoes has been observed but needs further confirmation. Dieldrin resistance was present in all the six species. Five species were susceptible to malathion, and only An. stephensi showed incipient malathion resistance without cross resistance to other organophosphates. The six species were susceptible to fenitrothion and propoxur. An. nigerimus and An. subpictus showed some evidence of resistance to fenthion, the remaining four species were fenthion-susceptible (15).

In 1983, Base line data on the insecticide-resistance of anopheline populations of the faislabad district is presented and their status of the susceptibility has been discussed. Two important malaria vector An. stephensi and An. culicifacies have developed resistance to malathion in addition to already known DDT and BHC/dieldrin resistance [16].

Latter on survey of Sindh for the status of insecticide resistance of anopheline population was carried out in 1983. All species except An. pulcherimus were DDT resistant, An. stephensi and An. subpictus resistant to Dieldrin, propoxur and fenitrothion are susceptible to six anopheline mosquitoes, whereas malathion susceptibility persisted throughout the province in both primary malaria vectors (17).

Methods

Mosquito collection was carried out 7 different sentinel localities of district Mirpur AJK during year 2013. Mosquito were collected by using mouth aspirator and CDC sweeper; from animal sheds and human dwelling; specimens were identified up to species level under binocular microscope by using taxonomic keys of Nagpal and Sharma 1995 (18). The susceptibility test was conducted by using WHO recommended susceptibility/resistance test kits and their guidelines. Five replicates of female mosquitoes (20-25) in each tube of primary and suspected malaria vectors were exposed at the WHO recommended diagnostic dose of insecticide.
impregnated papers from different groups i.e. Pyrethroids (Deltamethrin 0.05%, Lambdacyhalothrin 0.05%), organophosphate (Malathion 5%) and chlorinated hydrocarbon (DDT 4%).

**Results:**
Results showed that of test done on Anopheles culicifacies, against diagnostic dose of 4% DDT which belongs to chlorinated hydrocarbon showed resistance in all seven localities with percentage mortality ranged from 8.69% to 4.5%. Malathion belong to group of Organophosphate. The results of test done on Anopheles culicifacies, against 5% Malathion , showed mortality that ranged from 91.81% to 95.45% and Anopheles culicifacies is need verification to 5% malathion. Next three insecticides belong to pyrethroid group. Test results against 0.05%

### Table 1. Results of Susceptibility/Resistance Test done on A. culicifacies, with 0.05% Deltamethrin, 0.05% Lambdacyhalothrin, Permethrin, 4% DDT and 5% Malathion district Mirpur

<table>
<thead>
<tr>
<th>District</th>
<th>Localities</th>
<th>Deltamethrin</th>
<th>Lambdacyhalothrin</th>
<th>Permethrin</th>
<th>DDT</th>
<th>Malathion</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>No. of females</td>
<td>Corrected Mortality%</td>
<td>No. of females</td>
<td>Corrected Mortality%</td>
<td>No. of females</td>
</tr>
<tr>
<td>Mirpur</td>
<td>Cks (brs)</td>
<td>105</td>
<td>98.09% S</td>
<td>115</td>
<td>94.7% ?</td>
<td>110</td>
</tr>
<tr>
<td></td>
<td>Smw</td>
<td>105</td>
<td>98.26% S</td>
<td>115</td>
<td>94.2% ?</td>
<td>105</td>
</tr>
<tr>
<td></td>
<td>Mjc</td>
<td>115</td>
<td>97.39% ?</td>
<td>110</td>
<td>97.4% ?</td>
<td>105</td>
</tr>
<tr>
<td></td>
<td>Kqbd</td>
<td>119</td>
<td>97.66% ?</td>
<td>110</td>
<td>94.7% ?</td>
<td>105</td>
</tr>
<tr>
<td></td>
<td>Rma</td>
<td>119</td>
<td>97.47% ?</td>
<td>109</td>
<td>91.7% ?</td>
<td>110</td>
</tr>
<tr>
<td></td>
<td>Sangot</td>
<td>112</td>
<td>98.18% S</td>
<td>109</td>
<td>91.7% ?</td>
<td>105</td>
</tr>
<tr>
<td></td>
<td>Jatla</td>
<td>118</td>
<td>98.31% S</td>
<td>120</td>
<td>94.3% ?</td>
<td>115</td>
</tr>
</tbody>
</table>

**Chi Square**

<table>
<thead>
<tr>
<th></th>
<th>$X^2$</th>
<th>df</th>
<th>$P$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deltamethrin</td>
<td>13.21</td>
<td>4</td>
<td>0.040</td>
</tr>
<tr>
<td>Lambdacyhalothrin</td>
<td>4.902</td>
<td>4</td>
<td>0.55</td>
</tr>
<tr>
<td>Permethrin</td>
<td>4.851</td>
<td>4</td>
<td>0.563</td>
</tr>
<tr>
<td>DDT</td>
<td>1.917</td>
<td>4</td>
<td>0.927</td>
</tr>
<tr>
<td>Malathion</td>
<td>1.917</td>
<td>4</td>
<td>0.092</td>
</tr>
</tbody>
</table>

S= Susceptible if 98-100% observed mortality
? = 90-97% observed mortality suggests the possibility of resistance that needs to be further confirmed.
R= Resistant if <90% observed mortality
R1-R5= Replicates, C1-C2= Control
Level of Significance $p<0.05$; non-significance $p>0.05$, df= Degree of freedom, $\chi^2$= Chi Square Value
CKS (BRS)= Chaksarwai; PSMW= Pindisamberwal; KQBD= Kailaqabad; RMA, =rathowamuhammabali; mj= Mahjir colony; Sangot= Sangot sector; jatla= jatla

Deltamethrindiagnostic dose showed complete susceptible in all seven localities in Anopheles culicifacies with percentage mortality ranged from 98% to100%. Wild caught female Anopheles culicifacies showed percentage mortality ranged from 91.74% to94.78% and show need verification at all seven localities against 0.05% lambdacyhalothrin and 0.75% permethrin. The species were need verification with percentage mortality ranged from 91.74% to97.27% in all seven localities.

**Discussion**
Anopheles culicifacies exposed to various diagnostic doses of three pyrethroids (deltamethrin, lambdacyhalothrin, and permethrin), one organophosphate (malathion), and one chlorinated hydrocarbon (DDT), showed a range of mortalities in various localities of.
district Mirpur. *An. culicifacies* was resistant to DDT, susceptible with Deltamethrin and other three insecticide need verification.

As described in Table 1, results of test done on *Anopheles culicifacies*, against diagnostic dose of 4% DDT which belongs to chlorinated hydrocarbon showed resistance in all seven localities with percentage mortality ranged from 8.69% to 4.5%. Malathion belong to group of Organophosphate. The results of test done on, *Anopheles culicifacies*, against 5% Malathion, showed mortality that ranged from 91.81% to 95.45% and *Anopheles culicifacies* is need verification to 5% malathion. Next three insecticides belong to pyrethroid group. Test results against 0.05% Deltamethrin diagnostic dose showed complete susceptible in all seven localities in *Anopheles culicifacies* with percentage mortality ranged from 98% to 100%. Wild caught female *Anopheles culicifacies* showed percentage mortality ranged from 91.74% to 94.78% and show need verification at all seven localities against 0.05% lambdacyhalothrin and 0.75% permethrin. The species were need verification with percentage mortality ranged from 91.74% to 97.27% in all seven localities.

Chi-square tests were performed to compare populations collected from different locations for heterogenicity. At least five replicates of 

Rathor, et al. in 2012, studied susceptibility/resistance status of primary and suspected malaria vectors which are *Anopheles culicifacies* and *An. stephensi* and found they were most widely distributed in Islamabad. A total of twelve species were recorded during the study period. Insecticide impregnated papers with diagnostic dose of DDT (4%), Deltamethrin (0.05%) Lamdbacyhalothrin (0.05%), Malathion (5%) and Bendiocarb (0.1%) were used. Results showed that primary and suspected malaria vectors were susceptible to Deltamethrin and Lambdacyhalothrin while resistance to DDT and assorted results were shown against Malathion and Bendiocarb (19).

Rathor, et al. in 2013, Studied Pesticide susceptibility status of Anopheles mosquitoes in four flood-affected districts of South Punjab, Pakistan. The test results showed that both *Anopheles stephensi* and *Anopheles culicifacies* remained resistant to DDT and malathion. Tests with three commonly used pyrethroids, permethrin, lambda-cyhalothrin, and deltamethrin, detected resistance in the majority of cases, but in a number of localities mortalities with these three pyrethroids ranged from 80-97% and were therefore placed under verification-required status. This status indicates the presence of susceptible individuals in these populations (20).

However, with appropriate resistance-management strategies, the development of high levels of resistance can be prevented or delayed. The results of this study will provide a clue for monitoring and mapping of insecticide resistance in the malaria vector and an important evidence base for strategic planning for vector control.

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ETHICS OF OCCUPATIONAL HEALTH AND SITUATION IN PAKISTAN

Mohammad Salim

Health Services Academy, Islamabad (Correspondence to: Salim M salimwazirdr@gmail.com)

Abstract

Ethics of occupational health is a largely ignored subject and especially so in Pakistan. This article is written with a view to explain the phenomenon at a basic level so that healthcare workers of all cadres, students of medical profession, and those involved in the area at some level could benefit from it. Library of Health Services Academy Islamabad was used to search books; and electronic resources like Medline and Google scholar were also used. In conclusion it is stated that overall state of occupational health in this country is ignored by the lawmakers as well as public health professionals. There is lack of legislations to take care of the workers' health. The medical profession is found wanting to develop and practice proper code of ethics. There are massive inequities within and among different occupations that need exploring and reporting. It is ironic that the work places, where foundations of the subject of public health were laid down - in our country it is in the dock in the same work places. The medical profession in general and the public health practice in particular have to respond to the situation. Subjects of Ethics and Occupational Health have been on the bottom of agendas in the context of Pakistan. Reading them together is even rarer to find. This article takes into account the subjects of Ethics in medical profession and Occupational health, the ethics of occupational health, and situation in Pakistan pertaining to them. The situation is described at a very basic level academically to enable all those associated with occupational health, medical profession, and others to enable them to grasp the situation easily. It is hoped that this article will generate debate on these largely forgotten areas of immense public health importance. (Pak J Public Health 2014; 4(2):33-36)

Key Words: Ethics, Occupational Health, Ethics of Occupational Health, Pakistan

Introduction

Occupational health ethics is largely an ignored area on the premise that normative professional ethics could apply equally to other sub-specialties in the medical profession. Doctors who subscribe to the Hippocratic Oath and other professional codes apply these ethical principles in any circumstance where medical care needs to be provided and hence little thoughts have been directed towards having specific trainings including ethics of occupational health. Special training lacks even in developed countries with regard to ethics in occupational health. Owing to conflict around occupational health issues at workplace, health professionals do not feel comfortable as the nature of professionalism in medicine encompasses collaboration based on collegiality and consensus. There is no doubt that the workplace setting where healthcare has potential for conflict that stems not only from the conflictual nature of employer-employee relations, but because of the particular position in which health professionals are placed (1). One such conflict could be that though paid by the owners of the industry, doctors who provide occupational health services have an obligation to keep the confidentiality of individual workers, revealing only those facts that are essential for management to know about workers' health, and that only after obtaining informed consent of the workers. They have an equal obligation to inform workers of hazards to which they may be exposed in the course of their work (2).

Methods

The library of Health Services Academy Islamabad was combed for subjects of ethics and occupational health consulting textbooks and reference books. Search engines like Medline and Google scholar were searched for key words: Ethics, Bioethics, Occupational Health, Ethics in Occupational Health and Pakistan were used to search articles. Selection of materials from textbooks and articles was done to avoid repetitions of material. Terms that could explain the basics of Ethics and Occupational Health were included. The synthesized material is organized in way to explain the phenomenon in an essay form with background, history, occupational health, theories of ethics, and situation in Pakistan with a brief conclusion at the end.
History
A cursory look at the historical background of occupational health would entail that long before the public health experts could make recourse to mortality and morbidity data, the standardized mortality ratios (SMR) were used to highlight the fact that occupational groups like coal miners experienced a high mortality compared to general population (3). The today’s users and modifiers of such data must be greatly indebted to those pioneers. Bernardino Ramazzini, an Italian physician, is known as the pioneer of occupational medicine. In his book on occupation related diseases de morbisartificum diatribe (diseases of the workers), he outlined the diseases related to chemicals, dust, metal, repetitive movements, odd postures, etc. in 52 professions (4). The dictionary of medical ethics defines occupational medicine as: "addresses the interface between work and health. A largely preventive discipline, its aim is to minimize work related health problems" (5). The International Labor Organization (ILO) and World Health Organization (WHO) define it as: the attainment of the highest degree of physical, mental and social wellbeing of workers in all occupations (6).

For a considerable period of time, the terms of industrial medicine, factory medicine, and occupational medicine were used. Occupational health is the appropriate term used for it now a days as it takes into account the health of the workers with regard to preventive, and curative medicine. In clinical medicine, the diagnosis and treatment is the predominant activity, whereas in occupational health focus is more on cause and effect relationship between health impairment and occupational factors thus having a wide scope for research (7).

Occupational Health Practice
The practitioners of occupational medicine (health) are to deal with both employer and employee leading to a conflict of interest. Doctors, nurses, and other health professionals are subject to law and court. They have to make recourse to ethical principles if there is no violation of law and a decision has to be made as per the professional codes and values. The system of ethics applicable to occupational health is not entirely different from its application to other medical disciplines like: clinical practice, public health and research (8). The difference comes when we look at the context of its practice. Practitioners of occupational health usually have to deal with several constituencies, which might have adversarial relationship. These constituencies include: owners, shareholders, management, union leaders, workers, government regulatory agencies, and public interest groups. The practitioners have to maintain impartiality while dealing with them. The professionals deal in terms of medical practice, surveillance of workers’ health, compensations and research (2).

Theories and Principles of Biomedical Ethics and Occupational Health
Though the context and situations may be different and peculiar to occupational health, the theory of ethics is applicable to it as to all other disciplines of medical professions. The moral theories of ethics are: deontology and consequentialism. Deontology means that source of the moral value is the nature of the action taken without recourse to consequences. Deontological considerations concern what is actually done and notions of principles and duty have prominent roles. Consequentialism, implies that moral value of an action is never determined by the action itself but by reference to its consequences. Consequential moral theory is focused on results and the consequences of action. Utilitarianism, a part of consequentialism is more applicable to biomedical ethical theory (9). The deontologists can rescue their positions by finding more specific rules that do not conflict with each other or they may rank them in some hierarchy for conflict resolution. The utilitarianism regards actions as right if it produces as much or more of an increase in the happiness of all affected by it than any alternate action, and would consider it wrong if it does not (10).

The practicality of ethics is widely prescribed through the Appleton’s consensus of 1989. These principles of biomedical ethics are autonomy, beneficence, non-maleficence, and justice. Autonomy means respect for self-determination of others. In Western societies individual autonomy is given more weightage, whereas in Confucian societies of East Asia more emphasis is placed on community oriented and tradition based autonomy making more room for harmony and consensus than individual autonomy. Beneficence is the cornerstone principle of biomedical ethics that means doing good deeds. It is an obligation to contribute to the welfare of others. Non-maleficence is an obligation not to inflict harm on others. The fourth principle justice is a double construction of two seemingly opposed principles i.e. likeness and difference. The principle of Likeness also known as equity that implies an obligation that all persons have a right to greatest possible freedom of action which is compatible with all other persons having the same right regardless of ability to pay, age, gender, nationality, religious faith, ethnicity etc. The Principle of Difference requires that dependent and vulnerable persons have a right to claim and to obtain satisfaction of needs if their own efforts fail to achieve this. It is synonymous with solidarity according to John Rawls (11). There are certain codes that cater for occupational health practitioners’ needs. Some well-known ethical codes are the International Code of Ethics for Occupational Health Professionals (ICOH), (12) Guidance on Ethics for Occupational Physicians, adopted by the Faculty of Medicine of the Royal College of Physicians of the UK,
Occupational Health and Ethics - Pakistan

Pakistan, part of Indian subcontinent ruled by the British before 1947, inherited laws pertaining to laborers from its colonial masters through different acts. Even today the legislations of the same era are used. Presently, the laws that contain provision for occupational safety and health include: Dock Labor act 1934, Factories act 1934, Mines act 1923, and Workmen's compensation act 1923. These laws mainly cover the formal industrial sector (13). Owing to lack of laws pertaining to occupational health and safety as well as lack of enforcement the existing laws, in whatever shape they are, exposes workers to many hazards. A study on chemical hazards, reveal that despite their best efforts they could not find rules for workers' safety. Moreover, no data on surveillance and monitoring was available despite the fact that thousands of workers were exposed to such hazards (14). Another study of textile workers revealed that workers were exposed to levels of noise beyond international standards without safety and health measures (15). Situations are more precarious in occupations where there is extreme exploitation like brick kiln workers and other bonded labors. Such occupations are not covered by any statute book of the state (16).

The Social Security is extended to industries where 10 or more workers are employed through 7% deduction from their salaries as contribution. It covers first aid, medical care for the secured workers and their dependents, cash benefits in case of absence from work due to sickness or injury, maternity services and benefits to secured female works and wives of secured male workers, disablement gratuity, pension to the disabled persons, death grant and pension to the dependents of secured workers in case of death (17).

The occupational health professionals are involved in many manners in all of the above and conflict of interest may arise here. The medical doctors in Pakistan follow laws of the land and are under oath to follow Pakistan Medical and Dental Council’s (PM&DC) Code of Ethics of Practice for Medical and Dental Practitioners (18). This implies that in the absence of appropriate legislations and specific codes pertaining to occupational health, the health professionals have to rely on international codes like ICOH and Royal College of Physicians UK. Training in occupational medicine and ethics is also lacking in Pakistan and the concept of occupational medicine and practice hardly exists here (19). A review by Hyder et al reveals that literature pertaining to health ethics is scarce in Pakistan with very little authorship by Pakistani health professionals. Most of the available Pakistani literature pertains to clinical practice ethics. The authors have pleaded for the resurrection of Pakistan Journal of Ethics (20). In a study by Humayun et al, it is concluded that adherence to principles of ethics in medical practice is inadequate in Pakistan. The authors have suggested that bioethics be incorporated in undergraduate and postgraduate medical curricula and efforts were needed to be made to make people aware of their rights (21).

Conclusion

The aforementioned paragraphs took into account the occupational health, ethics applicable to it, and the state of both in Pakistan. It can be concluded that overall state of occupational health in this country is the victim of ignorance both by the lawmakers and public health. Neither there exist proper legislations to take care of the workers' health nor there seems to be an effort by the medical profession to develop and practice proper code of ethics. There are massive inequities within and among different occupations that need exploring and reporting. It is ironic that the work places, where foundations of the subject public health were laid down, in our country it is in the dock in the similar work places. The medical profession in general and the public health practice in particular have to respond to the situation.

References


GROUND WATER CONTAMINATION BY ARSENIC, SINDH PAKISTAN

Tufail Ahmed Bhatti, Ashfaq Ahmed, Saleem Wazir, Zahid Saddar

1,2 Health Services Academy, Islamabad, 3Assistant Professor, Community Medical Department, Ayub Medical College, Abbottabad, 4Project Coordinator, SHEDS Hyderabad Sindh (Correspondence to Bhatti TA: dr_tufailbhattia@yahoo.com)

Summary

Contamination of ground water by Arsenic semi-metal in nature causes Public health hazards. It enters drinking water supplies from natural deposits. UNICEF sponsored a National Sample Survey on arsenic contamination of ground water sources in 2001 and nine districts were surveyed in Pakistan. In April 2009 SEPA assigned the same task to the SHEDS organization to found contamination of ground water for arsenic in Sindh. This project was to establish the effective coordination and awareness among the community with detecting the arsenic level in their drinking water sources. The project was implemented to all six districts administration stakeholders through the meetings, trainings and field testing of water sampling. During implementation of the project various linkages were developed. The project trained 1296 volunteer’s participants in the trainings of six selected districts. In practical samples were collected from four main sources: hand pump, tube well, wells and main supply lines. The present study on Arsenic in drinking water samples have been conducted in Jamshoro, Sukkur, Dadu, Ghotki, Jacababad and Kashmore. The results on Arsenic concentration in drinking water samples showed higher in hand pumps as compared to the other sources. Out of 4926 samples 1506 samples (30.57%) exceeding WHO standard and 547 samples (11.10%) exceeding of Pakistan's standard for Arsenic. The data reveals that the most affected district was Sukkur which contains high level of Arsenic i.e. 42.82% as contamination of water. Government should make plan of alternate water supply in arsenic affected area. (Pak J Public Health 2014; 4(2):37-39)

Key words: Ground Water, Arsenic, Contamination, Pakistan

Introduction

Contamination of underground water with Arsenic has emerged as a public health problem during the last two decades, particularly in Asian countries. China, Bangladesh, India, Mangolia, Nepal, Afghanistan and Pakistan are few examples where Arsenic contamination of ground water has become a serious threat between 2000 and 2005 (1).

Arsenic is an inorganic element and its two toxic forms arsenite and arsenate have serious health effects on humans. Humans become its victim from air, food and water. World over, the major source of Arsenic toxicity in humans is the use of drinking water contaminated with arsenic (2). Its natural resources include rocks, minerals and soil. The major sources of environmental pollution with arsenic include the uncontrolled use of pesticides, wood preservatives, mining activities and petroleum refining (3).

Arsenicism or chronic arsenic toxicity (CAT) results from prolong exposure to arsenic and has varying adverse effects on human health coupled with unsatisfactory treatment. Although skin manifestations (pigmentation usually described as "raindrop" pattern and keratosis) are the commonest features associated with arsenicism, it is a multi-organ disease involving lungs, liver, stomach, peripheral vascular (Black foot disease) and nervous system (Peripheral neuropathy). Inorganic arsenic has been identified as a carcinogen and its chronic exposure increases the risk of skin, kidney, liver, lung and bladder cancer (2). The most vulnerable subgroup of the population is children, in which arsenicism beside its typical skin lesions is also responsible for mental retardation assessed by IQ (4).

The groundwater is the principal source of drinking water for the residents of majority of rural and many big cities of Pakistan. Water pollution is one of the serious problems in Pakistan, and is attributed to rapid urbanization and industrialization (3). In Pakistan, the water for household consumption is obtained either from ground or surface reservoirs and used without further treatment thus resulting in number of diseases (5). Water pollution is responsible for 30% of all diseases
and 40% of all deaths in Pakistan (6). According to the World Bank estimates, diseases due to contaminated water, sub-standard sanitation and poor hygienic practices cost Pakistan economy about Rs. 112 billion/year, over Rs. 300 million per day in terms of health costs and lost earning (7).

Arsenic contamination of groundwater in Pakistan, particularly in its central and southern parts is a serious problem. It is estimated that over 20% and around 36% of the population in Punjab and Sindh respectively are exposed to the risk of arsenicosis (8).

**Methodology**
The project was implemented to all six districts administration stakeholders through the meetings, trainings and field testing of water sampling.

**Results**
The study was conducted in six districts of Sindh, namely Jamshoro, Sukkur, Dadu, Ghotki, Jacobabad and Kashmore. Table 1 and 2 showing a total of 1296 trained volunteers participated in the study. 4926 water samples were collected from four main sources: hand pump, tube well, wells and main supply lines. Water samples collected from hand-pumps showed higher levels of arsenic as compared to other sources. Table 3 showing that out of 4926 samples, 1506 samples (30.6%) showed arsenic level exceeding WHO standard (<10µ/L) and 547 samples (11.10%) had arsenic concentration above the cut-off point recommended by Pakistan's standard for Arsenic. The data revealed that the most affected district was Sukkur, where 42.82% of water sources were found to be contaminated with high levels of arsenic.

<table>
<thead>
<tr>
<th>District</th>
<th>Taluka</th>
<th>Villages Covered</th>
<th>Are arsenic level in ground water (µL)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Sukkur</td>
<td>59</td>
<td>0 5 53 36 75 24</td>
<td>18 223</td>
</tr>
<tr>
<td>Jacobabad</td>
<td>39</td>
<td>0 0 52 21 79 1</td>
<td>5 5</td>
</tr>
<tr>
<td>Kashmore</td>
<td>14</td>
<td>0 10 16 6 9 1</td>
<td>0 0</td>
</tr>
<tr>
<td>Ghotki</td>
<td>14</td>
<td>0 10 51 47 33</td>
<td>33 24 2 218</td>
</tr>
<tr>
<td>Dadu</td>
<td>14</td>
<td>0 10 16 6 9</td>
<td>1 0 0 42</td>
</tr>
<tr>
<td>Jamshoro</td>
<td>14</td>
<td>0 10 16 6 9</td>
<td>1 0 0 42</td>
</tr>
<tr>
<td>Total</td>
<td>197</td>
<td>0 101 210 126</td>
<td>211 58 53 28 787</td>
</tr>
</tbody>
</table>

**Table 2: District wise union Council level Trainings /Meetings**

<table>
<thead>
<tr>
<th>District</th>
<th>Union Councils (Nr)</th>
<th>Participants (Nr)</th>
<th>Training Events</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sukkur</td>
<td>46</td>
<td>904</td>
<td>42</td>
</tr>
<tr>
<td>Jacobabad</td>
<td>39</td>
<td>926</td>
<td>39</td>
</tr>
<tr>
<td>Kashmore</td>
<td>37</td>
<td>715</td>
<td>35</td>
</tr>
<tr>
<td>Ghotki</td>
<td>40</td>
<td>951</td>
<td>40</td>
</tr>
<tr>
<td>Dadu</td>
<td>52</td>
<td>1203</td>
<td>52</td>
</tr>
<tr>
<td>Jamshoro</td>
<td>28</td>
<td>657</td>
<td>28</td>
</tr>
<tr>
<td>Total</td>
<td>242</td>
<td>5356</td>
<td>116</td>
</tr>
</tbody>
</table>

**Table 3: The distribution of Taluka-wise presence of Arsenic in the water sources is presented in the following table.**

Groundwater contamination with arsenic is growing public health problem and over 30 countries have reported serious arsenic contamination (2), with the worst hit area of Bangladesh and West Bengal, India (9). Pakistan is no exception and various studies have demonstrated the presence of high levels of arsenic in different parts of the country particularly in Punjab and Sindh provinces (1, 8, 10, 11). Around 0.5 million people
in Afghanistan, 52 million in India, 32 million in Bangladesh, and more than 2 million people in China are at risk of high levels of arsenic in their drinking water (1). A study conducted from 2001-03 in eleven districts of Punjab found mean arsenic concentration of 8.5±1.6ng ml-1 with 10% of the samples showing arsenic concentration in the range of 10-50 ng ml-1 (11). Another study conducted during 2005 in district Muzaffargarh (Punjab) showed that 58% of the water samples exceeded 10µ/L (12). Similarly 50.05% of water samples (n=19307) from district Rahim Yar Khan were found to be contaminated with arsenic with concentrations ranging from 20µ/L to 500µ/L (8).

**Conclusion and Recommendations:**
The groundwater in Sindh is heavily polluted with arsenic at the concentration levels well above the WHO recommended levels. The government should ensure the availability of safe drinking water to the population exposed to arsenic in their drinking water. Moreover, health education programs at community level should be organised to create awareness among people about the ill effects caused by using arsenic contaminated water.

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