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DENGUE IN PAKISTAN: Journey from a Disease free to a Hyper Endemic Nation

M. Rafiq Khanani,¹ Afsheen Arif¹ and Rasheed Shaikh²

Dengue fever (DF), Dengue Hemorrhagic fever (DHF) and Dengue Shock syndrome have been causing significant and incremental morbidity and mortality in various parts of the world. It was characterized a viral infection in 1906. The earliest known documentation of symptoms resembling dengue fever was recorded during the Chin Dynasty (AD 265-420) in the Chinese Encyclopedia of Symptoms. The illness was associated with flying insects near water and labeled as “The water poison”.¹

Dengue virus is an enveloped positive single strand 11 kilo bases long RNA virus belonging to the Flaviviridae family.² Four serotypes, Den 1, 2, 3 and 4 are responsible for Dengue viral infection in different regions of the globe and their relative prevalence varies temporally. Clinicopathological events in Dengue viral infection are poorly understood due to its unique features as all the four serotypes behaved differently in various regions as well as chronological order in which the infection is introduced into a community. Primary infection by any one type leads to mild to moderate disease and confer short-term (approximately 6 months) immunity against all the four types and lifelong immunity to the specific infecting type. However, subsequent ‘secondary’ infection by any other type may cause mild to severe disease which may prove fatal. Several manifestations of dengue viral infection are due to immunologically mediated tissue damage causing thrombocytopenia, leucopenia, increase capillary permeability, multi-organ dysfunction etc. Infection during early pregnancy usually does not cause any damage to fetus but in later term it infects the infant.³⁻⁵

Virus transmission usually involves the ingestion of viremic blood by aedes mosquitoes followed by an extrinsic incubation period of 8-10 days for viral replication before virus appears in the saliva and transmission on re-feeding to a susceptible human can

occur. As the blood meal stimulates oviposition by the female mosquito, which undergoes one or more reproductive cycles during the extrinsic incubation period, the virus may enter the egg and be passed to the next generation of mosquitoes.⁶

Before 1970 only nine countries had experienced DHF epidemics which escalated more than four-fold by 1995.⁷ It is estimated that about 120 countries currently have endemic DENV transmission, 2.5 billion i.e. two fifths of the world’s population is at risk of infection,⁸ and there are between 70-500 million infections of which 2.1 million are clinically severe, 500,000 cases of DHF require hospitalization and 21,000 reported deaths annually.

Dengue Virus Infection In Pakistan:

Dengue is endemic in Pakistan with its usual peak incidence in the post monsoon period.⁹ In children under 16 years of age it was reported for the first time in Pakistan as an undifferentiated fever in year 1985.¹⁰ During 1995 in Hubb, Baluchistan 75 cases and 57 deaths were reported.¹¹ In 2003, Dengue occurred in Haripur in which 1000 subjects were infected and 7 deaths registered. DEN 2 was dominant serotype. The same year in Khushab, Nowshera 2500 cases reported and 11 died. DEN 2 was found in 7 individuals out of 17 cases serotyped. In 2004 only 25 cases were reported from Islamabad and Karachi. In 2005, Karachi witnessed death of 13 patients out of 500 cases. In 2006, dengue was reported from Karachi, Sukkar, Nawabshah, Rawalpindi and Islamabad with about 5400 cases and 55 deaths.¹²⁻¹³ Co-circulation of the two serotypes DEN 2 and DEN 3 were noted in 2006 outbreak.¹⁴⁻¹⁵ In 2007, Karachi, Hyderabad, Mirpurkhas, Lahore, Haripur, Rawalpindi and Islamabad were affected resulting in 24 deaths out of 2700 reported cases. In 2008, Lahore got 1800 positive cases with three dengue serotypes (DEN 2, 3 & 4) and high frequency of DHF. Genotype of DEN 2 was subtype IV and subtype III of DEN 3.¹⁶⁻¹⁷ In 2009, overall 570 cases were reported and serotype 2 and 3 were prevalent.¹⁸ In 2010, 5000 positive cases were documented. Study conducted in Lahore, Sheikhpura and Gujranwala on 320 patients DEN 2 was the most prevalent followed by DEN virus type 1.¹⁹

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while in federal capital Islamabad 35 cases with one death. In Khyber Pakhtunkhwa 25 cases and 3 deaths and in Azad Jammu Kashmir 5 cases were reported.²¹

In 2011, Pakistan had the worst strike of dengue in which more than 20,000 cases and 300 deaths were reported officially which according to experts reflect under reporting. Lahore was the epicenter with maximum number of cases followed by Faisalabad, Rawalpindi and Sargodha.²⁰ In Karachi, Sindh 196 cases were reported.

Clinical presentation, laboratory diagnosis and management of dengue in Pakistan has been quite complex due to concurrent or super infection with malaria, typhoid and hepatitis.²²⁻²³ Highly variable mortality during various outbreaks may also be attributed to co-morbid conditions, lack of proper management guidelines and training of health care professionals.

Table 1: Dengue Infection, reported cases and deaths

Year	# of cases	# Deaths	# cases serotype/genotype done	Prevalent Serotype /Genotype
1985	Unknown	1	N/A	N/A
1994	145	1	N/A	DEN 1 and 2
1995	75	57	N/A	DEN 1,2 and 3
2003	3500	18	14/28	DEN 2
2004	25	0	N/A	N/A
2005	500	13	150 approx	DEN 2 and 3
2006	5400	55	1800 approx	DEN 2 and 3
2007	2700	24	N/A	DEN 2 and 3
2008	1800	N/A	N/A	DEN 1, 2 and 3
2009	570	N/A	N/A	DEN 2 and 3
2010	5000	N/A	320 approx	DEN 2 and 1
2011	20,000 (estimated)	>300	N/A	DEN 2 and 3

Fig 1: Changing Dengue Scenarion of Pakistan

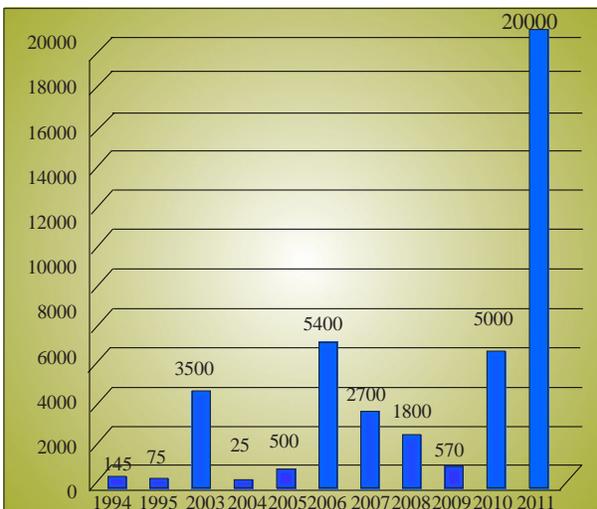
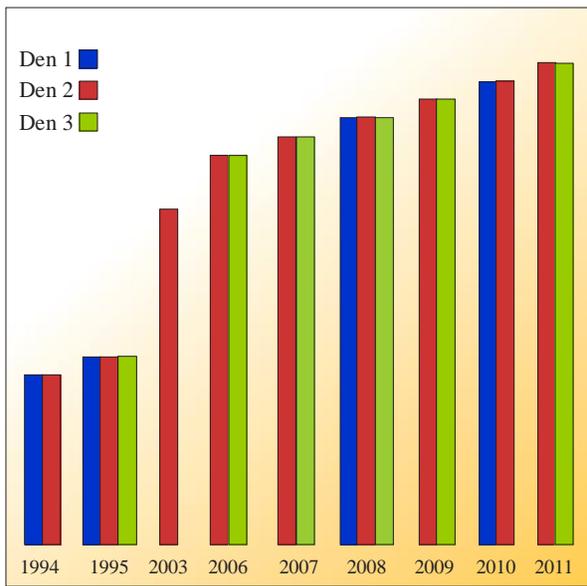


Fig 2: Dengue serotypes in various episodes



Prevention and Control:

Importance of conventional measures to reduce mosquito bites such as wearing full-sleeve clothes and long dresses to cover the limbs, use of repellents, coils and electric vapor mats, impregnated bed nets, trap lights, magnetic repellents and curtains can not be overemphasized.

Vector reduction is the most important measure in control of dengue but strategies differ from the ones which are employed for malaria control. Aedes is a domestic mosquito and attempts at spraying pesticides on streets and around the residential areas have forced the mosquitoes to move inside the homes aggravating the situation rather than improving it. Use of Long-lasting insecticide-treated materials (LL-ITMs) which can remain efficacious for >5 years, as bed nets and window curtains has potential for control of dengue in homes, offices and schools where people may be exposed to Ae. aegypti for 5 years at low cost.²⁴⁻²⁵

Other innovative technologies and approaches are being tested based on behavior of aedes mosquito and involve use of computers, Geographic Information System (GIS) and satellite imagery, cartographic, demographic, socioeconomic, and environmental data to implement Disease Early Warning and Response System.²⁶⁻²⁷ Eisen and Beaty²⁸ proposed Dengue Decision Support System (DDSS) for gathering information to gain new insights for making evidence based decisions to manage and evaluate Integrated vector control strategies.

Use of clinical syndromic surveillance (clinical diagnosis of dengue) rather than laboratory confirmed dengue to trigger vector control response activities can shorten the response time for emergency vector control by several weeks; this approach can be used to rapidly implement vector control and remove local foci of dengue virus transmission within and around the homes of suspected dengue patients in less than 28 hours of clinical diagnosis.²⁹ If implemented with proper planning and at very early stage of outbreak there is a great potential for containing dengue.

There is a great need to conduct research in various aspects of dengue virus and mosquito vector. Genotype and serotype analysis, larval indices calculation and risk management, temporal and spatial pattern, statistics, reasons behind major breakthroughs, etc require thorough investigations.³⁰ An increased understanding of genetic factors that contribute to disease development and complications would also help define more clearly populations at risk.³¹

If Pakistan has to control dengue viral infection a multipronged strategy based on lessons learned from other countries, use of latest technologies involving all the stake holders for integrated vector control and dengue case management needs to be addressed as a national policy with adequate commitment of resources.

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Most Prevalent Diseases with Relation of Body Mass Index and Waist Circumference in Karachi, Pakistan

Shamim A. Qureshi,¹ Muhammad Muzammil Ur Rehman,¹ Muhammad Bilal Azmi² and Shaima Hasnat¹

ABSTRACT

Objectives: To relate the body mass index (BMI) and waist circumference (WC) with diseases commonly found in Karachi.

Subjects and Methods: One hundred sixty one subjects of age group of 35 to 74 years were studied through cross-sectional questionnaire based survey from different areas of Karachi from February 2010 to January 2011. Height and WC were measured while BMI was calculated by standard formula. Data was analyzed by using GraphPad Software and mean \pm SD were used to interpret the findings.

Results: The findings describe the percentages of different diseases commonly found in study population like 32.91% have diabetes with BMI 26.69 ± 4.4 kg/m² and WC 35.92 ± 4.3 inch, 30.43% have hypertension with BMI 26.79 ± 4.42 kg/m² and WC 36.31 ± 4.72 inch, 14.28% have cardiovascular diseases BMI 25.38 ± 4.10 kg/m² and WC 36.17 ± 3.91 inch, 10.55% have bone related problems with BMI 26.51 ± 4.52 kg/m² and WC 38.11 ± 6.4 inch, 6.83% have asthma, 6.21% have migraine, 4.96% have arthritis and 1.86% was found anemic with collective BMI 25 - 29 kg/m² and WC 34 - 39 inch. Whereas 30.43% of population have no disease (control) with BMI 24.03 ± 3.68 kg/m² and WC 34.11 ± 3.86 inch.

Conclusion: The results concluded that diabetes mellitus ranked first and the most commonly found disease followed by hypertension, cardiovascular and bone related problems, asthma, migraine, arthritis and anemia. Over all the highest rate of most of the commonly found diseases in Karachi was observed in participants of 45-54 years with BMI > 25 kg/m² and WC > 35 inch.

Key words: BMI, waist circumference, percentage, Karachi.

INTRODUCTION

An abnormal fat deposition in adipose tissue on both subcutaneous and visceral body region is the basic characteristic of obesity¹ to the level that weakens the health and considered as an independent risk factor for most of the acute and chronic diseases in the world such as diabetes mellitus,²⁻³ cardiovascular diseases,⁴ stroke,⁵⁻⁶ dyslipidemia,⁷ osteoarthritis,⁸ cancer of several sites like endometrial, breast and colon,⁹⁻¹⁰ hypertension¹¹ and other metabolic health risk.¹² The frequency of overweight and obesity is increasing with high rate and estimated to be the second leading cause of preventable death after cigarette smoking in both developed and developing countries by affecting all segments of the population, including men, women

and children.¹³⁻¹⁶ It is also now becoming an alarming cause of disability and death in many developing countries.¹⁷⁻²⁰ A prospective study conducted in 2007 specifies overweight and obesity are potential risk sources for psoriasis in women.²¹ According to World Health Organization (WHO), globally almost 1.5 billion adults above the age of 20 years were found overweight in 2008 with high prevalence in female gender and nearly 43 million children less than the age of 5 years were overweighed in 2010.²² This figure is expected to increase up to 65 % by the year 2015 in adult population.²²

In clinical setting obesity or adiposity is conveniently measured by body mass index (BMI)²³ and proved that high BMI is associated with increased health risk because of its association with adiposity.²⁴⁻²⁵ Indeed within a given population BMI is positively associated with adiposity however this relation can be altered by numerous factors such as age, gender, race and physical activity patterns. The WHO guidelines classify individuals as underweight with BMI < 18 kg/m² reflects the malnutrition state that may lead to clinical problems, normal weight having BMI 18.50 - 24.99 kg/m² reflects

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good health with long life expectancy, overweight or pre-obese with BMI 25-29.99 kg/m² with increasing risk of co-morbidities and obese further categories into class I with BMI 30 - 34.99 kg/m², II with BMI 35-39.99 kg/m² and III with BMI > 40 kg/m² with moderate, severe and very high risk of co-morbidities respectively.⁵ It has been reported that the middle-aged adults with BMI ranging from 35-40 kg/m² are at high risk of hypertension, diabetes, etc worldwide and associated with twice an increase in healthcare expenditure than normal weight and persons of same age group with BMI > 40 kg/m² doubles the healthcare costs.²⁶

Research has indicated that central adiposity is associated with increased health risk²⁷ and waist circumference (WC) is considered as one of its measurements beside waist-to-hip and waist to height ratios.⁴ It is established that WC is linked with morbidity and mortality independent of BMI.²⁵ Recent attention has been paid to the applicability of anthropometric markers to measure abdominal obesity and the association of WC with health risk like cardiovascular diseases (CVD).¹ WC is also recognized as a key component of the metabolic syndrome in both children and adults.²⁸ Similarly, a retrospective study reported that WC is a good predictor of insulin resistance.²⁹ The guidelines of National Institute of Health (NIH) clearly describes that the adult women and men having WC greater than 35 and 40 inches respectively are considered at higher risk of obesity related disorders.³⁰

Since BMI does not independently provides a complete estimate of body fat distribution and WC is another effective clinical tool to assess the risk associated with obesity and more importantly linked to measure CVD as compare with BMI.¹² The WHO also recommends that WC should be used as an additional measure to identify those at increased risk of obesity-associated illness due to excess abdominal fat.³¹⁻³² Interestingly, WC criteria for the diagnosis of abdominal obesity are not applicable uniformly to all population and ethnic groups.³³ Therefore this study was conducted to relate the body mass index (BMI) and waist circumference (WC) with diseases commonly found in Karachi in 2010 and in future a countrywide survey will help to assess the overall performance.

MATERIALS & METHODS:

STUDY DESIGN

The present study design was cross-sectional questionnaire-based survey and data were collected from different areas of Karachi.

STUDY PROTOCOL

Verbal consent was taken from study subjects before handing over the questionnaire with an assurance for confidentiality of information and their professional acquaintance. Questioner contain different variables related to life-style, mood and dietary patterns, state of health / name of disease (if any diagnosed), parameters to calculate body mass index (BMI) and waist circumference (WC). Initially questioners were given to randomly selected physically observed normal to obese subjects (n=210) of age 35 year and above. Finally total study population (n=161) consisted of both genders including male (n=82) and female (n=79) age ranging from 35 to 74 years with low to medium socioeconomic status of which some people were doing government jobs while majority were engaged with private jobs, some were retired persons and most of the females were house wives was selected as 20 participants had regretted their availability and 29 were not reported their response in defined manner hence they were excluded from the study. The return rate of questionnaire was approximately 77%. The expected commonly prevalent diseases in Karachi that included in questioner were anemia, arthritis, asthma, diabetes mellitus, heart diseases, hypertension and migraine.

Whereas different medical terms that have been written by participants like osteoporosis, backache, shoulder pain, knee swelling, vitamin D and calcium deficiencies, etc, were collectively included as bone related problems in the present survey. The study population was divided in patients with defined diseases and compared with the same age group population with no disease (control).

The population younger than 35 year and elder than 74 year of age was excluded from the study. Data was collected through convenient sampling method from different areas of Karachi including Federal B area, Gulistan-e-Johar, Gulshan-e-Hadeed, Kemari, Millat Town, Malir, North Karachi, North Nazimabad, Qasba colony and Shah Faisal Colony from February 2010 to January 2011 in Karachi.

WC AND BMI ASSESSMENTS

Inch tape (Butterfly brand) was used to measure waist circumference, height and weight machine (CAMRY) to measure weight of individuals of study population. Whereas the formula used to measure their BMI was adopted from topic entitled "Effect of obesity on the incidence of type 2 diabetes mellitus varies with age"²

$$\text{BMI} = \frac{\text{WEIGHT (KILOGRAM)}}{\text{SQUARE OF HEIGHT (METERS)}}$$

STATISTICAL ANALYSIS

The results were recorded and expressed as mean \pm SD and finally percentage of each commonly found diseases in study population was calculated by using GraphPad Software, Quick Calcs Online calculators for scientists.³⁴

RESULTS

I. Percentage of different diseases in study population of Karachi and their association with BMI (kg/m^2) and WC (inch).

The percentage of different diseases and their association with BMI and WC described that out of 161 people, 32.91 % have diabetes mellitus with BMI $26.69 \pm 4.4 \text{ kg}/\text{m}^2$ and WC 35.92 ± 4.3 inch. Forty nine (30.43 %) people have hypertension with BMI $26.79 \pm 4.42 \text{ kg}/\text{m}^2$ and WC 36.31 ± 4.72 inch. Twenty three (14.28 %) people have CVDs with BMI $25.38 \pm 4.10 \text{ kg}/\text{m}^2$ and WC 36.17 ± 3.91 inch. Seventeen (10.55 %) have bone related problems with BMI $26.51 \pm 4.52 \text{ kg}/\text{m}^2$ and WC 38.11 ± 6.4 inch. Eleven (6.83%) persons have asthma with BMI $27.27 \pm 4.57 \text{ kg}/\text{m}^2$ and WC 37.18 ± 4.21 inch. Ten (6.21 %) persons have migraine with BMI $25.29 \pm 4.47 \text{ kg}/\text{m}^2$ and WC 35.6 ± 2.59 inch. Eight (4.96%) persons arthritis with BMI $29.13 \pm 3.15 \text{ kg}/\text{m}^2$ and WC 38.5 ± 3.4 inch. Only three persons (1.86 %) have anemia with BMI $27.73 \pm 7.33 \text{ kg}/\text{m}^2$ and WC 34 ± 3.46 inch. Whereas out of 161 people, 30.43 % persons were found normal not suffering from any of the above disease with BMI $24.03 \pm 3.68 \text{ kg}/\text{m}^2$ and WC 34.11 ± 3.86 inch (Table 1 & Figure 1).

II. Percentage of diseases in different age groups of both gender of study population.

Asthma was found in all age groups but its presence was high (3.10%) in participants of age 45-54 years followed by 1.86%, 1.24% and 0.62% in other participants of 65-74, 35-44 and 55-64 years respectively. Mostly females were affected from the same allergy. Only females of 35-44 years of age were found anemic. Arthritis was found in all age groups but it was high in age group of 55-64 years (1.86 %) with 1.24 % females and 0.62 % males. Whereas 1.24% participants in each age group of 45-54 and 65-74 years were suffering from the same problem. In age group of 35-44 years only 0.62 % was suffering from arthritis and that was female, no male was found. Bone related problems have an effect on all age groups. It severely affects participants of 45-54 years (5.59 %), of which 4.34 % females and 1.24 % males. Similarly diabetes had affected all age groups like 13.04 % was found in

participants of 55-64 years, followed by 9.93%, 6.10%, 3.72% in age groups of 45-54, 65-74 and 35-44 years respectively. Hypertension was found in all age groups, of which its highest percentage 14.90 % was found in people of 45-54 years. Participants with migraine were found as 3.10 %, 2.48%, 0.62% in age groups of 45-54, 35-44, 55-64 years respectively and it was not found in age group of 65-74 years (Table 2).

III. Distribution of study population according to WC.

Out of total study population 41.61% people were found having WC ranging from 31-35 inch with 21.11% males and 20.49% females. WC from 36-40 inch assessed in 34.16% people with 18.01% males and 16.14% females. WC > 40 inch showed by 12.42% people with 7.45% males and 4.96% females. Only 11.80% people were found having waist circumference < 30 inch with 7.45% males and 4.34% females (Figure 2).

IV. Distribution of study population according to BMI

Out of total study population 46.58% people were found having BMI from 18.5-24.9 kg/m^2 with 29.81% males and 16.77% females. 37.26% participants with BMI 25- 29.9 kg/m^2 were found with 19.25% females and 18.01% males. The percentage of people having BMI > 30 kg/m^2 was found as 16.77% with 14.28% females and 2.48% males. Whereas 3.72% participants were found having BMI < 18.5 kg/m^2 with 3.10% females and 0.62% males (Figure 3).

Figure 1: Different disease (%) in study population

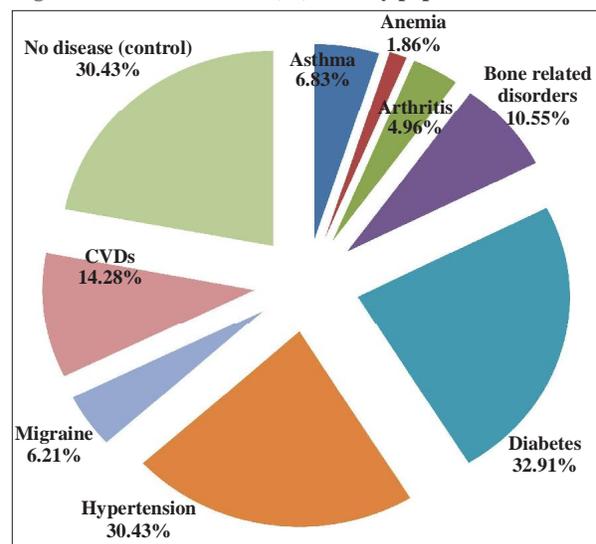


Table 1: Study of BMI (kg/m²) and waist circumference (inch) with different disease in study population

Disease	N (%)	Height (m)	Weight (kg)	BMI (kg/m ²)	Waist (inch)
Asthma	11 (6.83)	1.62 ± 0.08	71.57 ± 11.42	27.27 ± 4.57	37.18 ± 4.21
Anemia	3 (1.86)	1.56 ± 0.03	68.33 ± 18.92	27.73 ± 7.33	34 ± 3.46
Arthritis	8 (4.96)	1.64 ± 0.08	78.23 ± 6.07	29.13 ± 3.15	38.5 ± 3.4
Bone related problems	17 (10.55)	1.66 ± 0.10	75.71 ± 14.71	26.51 ± 4.52	38.11 ± 6.4
Diabetes mellitus	53 (32.91)	1.60 ± 1.38	68.15 ± 11.52	26.69 ± 4.4	35.92 ± 4.3
Hypertension	49 (30.43)	1.64 ± 0.12	73.04 ± 13.03	26.79 ± 4.42	36.31 ± 4.72
Migraine	10 (6.21)	1.68 ± 0.10	71.31 ± 8.82	25.29 ± 4.7	35.6 ± 2.59
Cardiovascular diseases	23 (14.28)	1.63 ± 0.13	69.13 ± 12.42	25.38 ± 4.10	36.17 ± 3.91
No disease (Control)	49 (30.43)	1.65 ± 0.11	65.93 ± 11.86	24.03 ± 3.68	34.11 ± 3.86

Table 2: Diseases in different age groups of both genders in study population

Age (years)	Asthma (%)	Anemia (%)	Arthritis (%)	Bone related problems (%)	Diabetes mellitus (%)	Hypertension (%)	Migraine (%)	CVDs (%)
35-44 year								
N	2 (1.24)	3 (1.86)	1 (0.62)	5 (3.10)	6 (3.72)	8 (4.96)	4 (2.48)	3 (1.86)
Male	1 (0.62)	0	0	1 (0.62)	2 (1.24)	3 (1.86)	1 (0.62)	2 (1.24)
Female	1 (0.62)	3 (1.86)	1 (0.62)	4 (2.48)	4 (2.48)	5 (3.10)	3 (1.86)	1 (0.62)
45-54 year								
N	5 (3.10)	0	2 (1.24)	9 (5.59)	16 (9.93)	24 (14.90)	5 (3.10)	5 (3.10)
Male	1 (0.62)	0	0	2 (1.24)	8 (4.96)	10 (6.21)	2 (1.24)	1 (0.62)
Female	4 (2.48)	0	2 (1.24)	7 (4.34)	8 (4.96)	14 (8.69)	3 (1.86)	4 (2.48)
55-64 year								
N	1 (0.62)	0	3 (1.86)	1 (0.62)	21(13.04)	13 (8.07)	1 (0.62)	10(6.21)
Male	0	0	1 (0.62)	1 (0.62)	11 (6.83)	7 (4.34)	1 (0.62)	6 (3.72)
Female	1 (0.62)	0	2 (1.24)	0	10 (6.21)	6 (3.72)	0	4 (2.48)
65-74 year								
N	3 (1.86)	0	2 (1.24)	2 (1.24)	10 (6.10)	4 (2.48)	0	5 (3.10)
Male	3 (1.86)	0	2 (1.24)	2 (1.24)	6 (3.72)	2 (1.24)	0	3 (1.86)
Female	0	0	0	0	4 (2.48)	2 (1.24)	0	2 (1.24)

Figure 2: Distribution of total study population according to WC (inch)

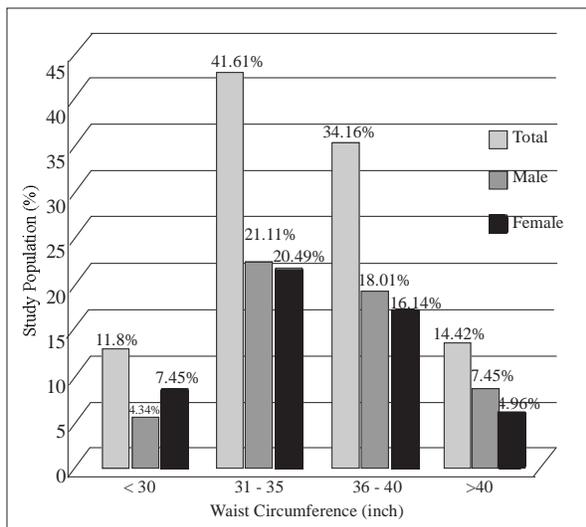
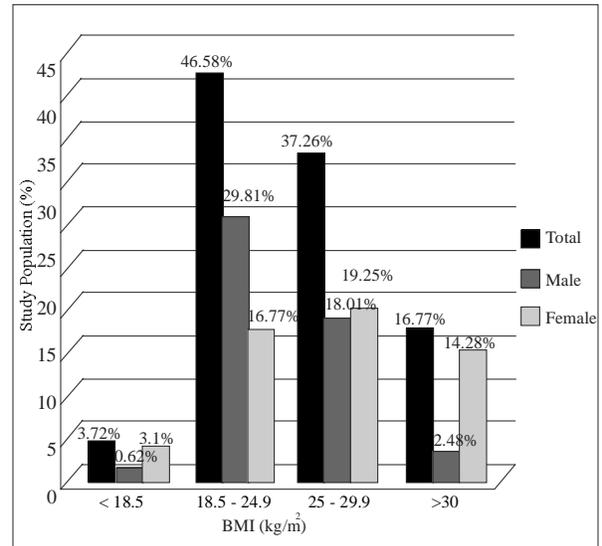


Figure 3: Distribution of total study population according to BMI (kg/m²)



DISCUSSION

Due to the sedentary life-style and change in dietary pattern, the number of overweight people increases day by day which in turn increases the risk of obesity worldwide.³ Obesity doesn't represent health but it may become an independent risk factor for most of the acute and chronic diseases such as cardiovascular diseases, diabetes mellitus, osteoarthritis, cancer, hypertension etc. Obesity occurs when energy intake exceeds then energy expenditure.¹⁵ There are number of factors that contribute obesity including age, sex (females are prone to obesity as compared to male), genetic makeup, over eating, different emotional conditions (depression, hopelessness, anger, boredom, etc), sedentary lifestyle, medication, etc.⁴ Beside these, change in diet pattern like high-fat diet and culture of junk food/ fast food which has been prevailing all over the world now-a-days strongly affect both genders by enhancing the lipid deposition.¹⁴ The life-style including both professional and domestic also contributes the risk of obesity such as females from high-income families as compared to low-income families are normally dependent on maids or servants for raising their children and other house-hold works that also become one of the factors which minimizes the exercise that body really needs. No doubt they used to of passing certain period of time in a day in different slimming centers or gyms but it effects gradually and slowly or produced no physically apparent effect. Adapting sedentary life style is the beginning of different conditions such as diabetes, hypertension, dislipidemia, coronary heart diseases, arthritis and others.³⁵ It has been reported that even normal activities such as standing or walking around at home for house hold works and brisk walking are associated with significantly low risk of obesity and its related problems.³⁶ On the other hand females from low-income families are often tangled in different financial and other domestic problems like multiple pregnancies, inadequate medical status, insufficiency of healthy food especially in Asian countries like Pakistan, India, Bangladesh, etc induced mental and physical exhaustion or depression in them that in turn enhanced the risk of non-communicable diseases such as diabetes, hypertension, etc, which again developed the risk of obesity.³⁷ Globally, male gender from both high- and low-income classes are also showing high incidence rate of obesity because of different factors, the most important of which is job-oriented stress including giving more time to job to earn more money and adapting negative habits to energize themselves and minimize job stress such as smoking, alcohol intake or any other so called energy drinks etc³⁸ that also enhanced the hazard of hypertension, hyperlipidemia,

cardiovascular diseases, etc, which may leads to the increase chances of physical disability and hospitalization.^{7,11,26}

The present survey described the percentage of different diseases commonly found in study population belong to metropolitan city, Karachi, like 32.91% have diabetes, 30.43% have hypertension, 14.28% have cardiovascular diseases, 10.55% have bone related problems, 6.83% have asthma, 6.21% have migraine, 4.96% have arthritis and 1.86% was found anemic. However, 30.43% of population have no disease and serve as control (disease free subjects). Therefore, the most commonly found non-communicable disease in study population of Karachi was diabetes that equally affects both genders of all age groups and its highest rate (13.04 %) was found in people of 55-64 years. However its incidence was start observing from people of 35 years goes up to people of 74 years of age. The second commonly found disease was hypertension that also affects both genders of study population by observing its highest rate (14.90%) in persons of 45-54 years. Cardiovascular diseases ranked third in this survey and its high rate was observed in persons of 55-64 years. This observation was also strengthens the concept that diabetes and hypertension together increases the risk of cardiovascular diseases.³⁹ Fourth ranked bone related problems was found in age group of 45-54 years that include most of the females and it must be due to post-menopausal effect or low intake of vitamins and minerals.⁴⁰ However few males were also found affecting from the same bone related problems in 65-74 years of age. Again people of 45-54 years of age were found affecting by the fifth and sixth ranked diseases including asthma and migraine. Asthma is a type of allergic reaction or inflammation of respiratory tract caused by number of allergens such as dust, pollen, certain chemicals, etc.⁴¹ Whereas migraine is a type of headache that normally felt in one side of the head. Its main cause is still unclear but may be due to abnormal brain activity and triggered by different factors such as physical and emotional stress, certain odor, bright light, etc and it has been reported that it first happens in 10-45 years of age and may begin later in life.⁴² The seventh and eight ranks go to arthritis and anemia. The incidence rate of arthritis was starting from 35 years in female while observed in males of 64-74 years. Arthritis is an inflammation of joints and it is due to the breakdown of cartilage because of number of reasons including general wear and tear of joints, autoimmune disease, broken bones, etc.⁸ Anemia is characterized by insufficient amount of hemoglobin and most of the females are anemic worldwide and it has been reported earlier that obesity is associated with low serum iron concentration.⁴³

According to the classification of WHO, the BMI and WC of overweight persons are in the range of 25-34 kg/m² and greater than 34 inch respectively.⁵ Interestingly all the participants of the present survey who were suffering from different commonly found diseases in Karachi also showed their BMI and WC in the same range. Only anemic females showed BMI equivalent to overweight people but WC equivalent to normal people (34 inch). However participants with no diseases (control group) demonstrated BMI 24.03 kg/m² and WC 34.11 inch which are good and described by different studies for healthy people.⁵ Over all, the present survey reveals that females are more susceptible to obesity than males and are at greater risk of different diseases by showing 14.28% females with BMI > 30 kg/m². The same range was also demonstrated by only 2.48% males. On the basis of WC there are almost equal number of males and females found at risk of diseases due to obesity by showing WC > 35 inch (The WC range for male is > 40 inch and for female is > 34 inch). The observations of BMI and WC strongly support the incidence rates of first three commonly found diseases in present survey as fat deposition not only enhanced the risk of insulin resistance in body but also disrupt the vasculature of blood capillaries (including the coronary arteries) thus increased the risk of type II diabetes, hypertension and cardiovascular diseases in population.^{2,28,31}

Therefore, it has been suggested that people > 40 year should take few important precautions to reduce overweight and to prevent the risk of obesity including eat healthy or low-fat diet with equal proportion of vegetable and meat, adapt appropriate physical activity (jogging/ exercise/routine house-hold work) with mental relaxation and good cultural values. All these good habits will help them to maintain their BMI and waist circumferences within normal ranges (which are not influenced by genetic make-up of an individual) and may decrease the risk of chronic diseases that normally induced by overweight or obesity.

CONCLUSION

The results concluded that diabetes mellitus ranked first and the most commonly found disease in study population of Karachi, followed by hypertension, cardiovascular and bone related problems, asthma, migraine, arthritis and anemia. Over all the highest rate of most of the commonly found diseases in Karachi was observed in participants of 45-54 years with BMI > 25 kg/m² and WC >35 inch.

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Factors and Demographic Characteristics Related to Nursing Workplace Satisfaction: Perspectives of Nursing Care Providers at Tertiary Care Hospitals of Karachi

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ABSTRACT

Objective: To assess factors related to workplace satisfaction of nursing care providers employed at different tertiary care hospitals of Karachi and to analyze the effect of demographic characteristics on satisfaction factors.

Subjects and Methods: A cross-sectional study was conducted at different tertiary care hospitals of Karachi. Two hundred nursing care providers filled the standardized Nursing Workplace Questionnaire selected through convenient sampling method from February 2010 to May 2011.

Results: The overall satisfaction score was 56.05 ± 6.812 . Pleasure with job, mental relaxation, workplace communication, workplace learning environment, workplace support and workplace dependency were the most important factors describing satisfaction of nursing care providers. Females and unmarried respondents had less workplace support. Those having lower salary enjoyed and were pleased with job more than those who had higher salary. Younger respondents were less satisfied with workplace. Therefore, they had significantly lower scores of enjoyment, job satisfaction and pleasure with job. Participants with higher degree were less satisfied, enjoyed and pleased with job and also had less workplace communications.

Conclusion: It was concluded that workplace support caused highest positive impact on job satisfaction and positive perception with colleagues with healthier workplace learning.

Key words: Care providers, demographic, factor analysis, Karachi, nursing, satisfaction, workplace.

INTRODUCTION

Nursing profession is distinguished as a thankless occupation because care provider renders its qualification, services and skills to serve, care and improve the health status of mankind. This profession faces many challenges worldwide in which workplace job satisfaction (associated with different factors) is the broadly studied parameter.¹

Workplace satisfaction is actually the extent of one's constructive involvement and integrity towards a job or its mechanisms² and it is the level of encouragement or appreciation with which employees scrutinize their work.³ Job satisfaction remains a key factor for assessing

both employer and employee,⁴ employees' job satisfaction and their commitment directly interlinked with the productivity and sustainable performance of organizations and even it is a significant subject for health care organizations today.⁵ Recent studies would suggest that higher occupational satisfaction levels of employees within an organization are interrelated to an organization's ability to transform as a flourishing entity,⁶ because satisfied employees tend to be more industrious, innovative, and devoted to their workplace.⁷ Interestingly there is a direct association between staff satisfaction and patient satisfaction which have been observed in health care organizations.⁸ Despite being solely focused on satisfied or dissatisfied professional environment, it is also critical to probe the expectations that employees have of what their profession should make available.⁹

Hence, satisfaction with nursing profession is subjective to the availability of essentially required facilities in the working environment, as well as the individual's compatibility with the profession.^{2,10-12}

The scarcity of competent and well trained nurses globally and locally has been well documented as primary comprehensive source among the factors linked

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with workplace dissatisfaction,¹³⁻¹⁵ side by side workplace dissatisfaction is often produced as a result of intense workloads, low salary structure, management styles and policies, lack of inspiration, insufficient training programs and lack of respect also.¹⁶ Researchers also identified as elevated level of job oriented stress decreases the employees' organizational loyalty and becomes the major reasons due to which nurses leave their positions.¹⁷ Previous researches significantly contributed to the importance of heavy workloads as it exhausted the nursing care providers with their profession,¹⁸ thus causing dissatisfaction with profession^{2,19-21} and becoming the distinct greatest cause of stress-related occupational diseases.²²⁻²³ Persistent dissatisfaction with occupation not only induces stress but is also characterized as a health hazard of work-related stress that may cause anxiety, alcohol dependency, cardiovascular problems, depression and musculoskeletal problems.²⁴

There is no extensive and significant reporting in literature related to the assessment of nursing workplace satisfaction (NWS) of nursing care providers in Karachi, although the perception of registered nurses in tertiary care hospital of Karachi with lesser sample size was reported previously.²⁵ Similarly, the role of human resource management with nursing job satisfaction having only female nurses perception was published recently.²⁶ A cross-sectional descriptive study to understand the level of job satisfaction at Rawalpindi tertiary care hospitals with small sample size was currently reported in 2011.²⁷ Therefore to fill this gap, the present study is to evaluate the Nursing workplace satisfaction among different tertiary care hospitals of Karachi and in future a countrywide survey will help to assess the overall performance.

OBJECTIVE OF THE STUDY

The objective of this study was to determine factors related to workplace satisfaction of nursing care providers employed at tertiary care hospitals of Karachi and to analyze the effect of demographic characteristics of these professionals on satisfaction factors.

METHODOLOGY

The data were collected from the nursing care providers of different tertiary care hospital of Karachi and the participants were chosen irrespective of their occupational affiliations, age, marital status and gender.

The procedure of sample size calculation was done by taking standard deviation of satisfaction scores equal 0.51⁸, 95% confidence interval and 0.75 unit margin of error, the computed sample size was 178. Adding

20% non-response rate, the approximated sample size was 214 which were rounded off to 225 nursing professionals.

Volunteers from different tertiary care hospitals of Karachi were selected; the investigator¹ himself visited and collected the information from the participants through convenient sampling method. Verbal consent was taken from the study subjects before handing over the questionnaire, with an assurance for confidentiality of information and their professional acquaintance. The entire duration of data collection covered the period from February 2010 to May 2011.

The survey is based on the pre-tested and standardized questionnaire on nursing workplace satisfaction (NWS), available through New South Wales (NSW) Department of Health, Sydney, used as an instrument to collect data. Special permission was taken to use questionnaire for this research study, individually from the author of questionnaire and from the NSW officials also (A copy of questionnaire and permission mails are available on request). Total Eighteen items (18) of NWS questionnaire is categorized into three (03) heads of variables: (1) How much nurses enjoy their job; (2) Involvement in job; (3) The people you work with. Socio- Demographic information of study participants was also included. Responses to all items were scored on 5 points Likert scale (1=fully agree, 2=agree, 3=partly agree/disagree, 4=disagree, 5=definitely disagree) with the statement.

STATISTICAL ANALYSIS:

Data were entered and analyzed using PASW Statistics 18. Mean \pm standard deviation were computed for satisfaction scores. Frequencies and percentages were computed for demographic characteristics.

MEASURES:

Individual scores were added-up to get an overall nursing workplace satisfaction scores. The already described satisfaction sections in the questionnaire were also accumulated separately. Additionally, enjoyment score, workplace satisfaction score and perspective with colleague score were obtained for further analyses.

Principal axis factor analysis using Varimax rotation was run to sort out factors which provided most information of nursing workplace satisfaction data. The criterion of retaining the factors was set if Eigen value was at least 1.0. New satisfaction pertaining variables were then grouped and named with the criterion if variables had loadings more than or equal to 0.30 with related factors. The responses of these

newly constructed variables were then summed-up depending on the coefficients of factor scores.

Normality test was assessed with Shapiro - Wilk Statistic. If P value was more than 0.05 then score was considered to be normally distributed.

The correlation between newly constructed variables scores were found out with the scores of already described satisfaction sectioned using Spearman's Correlation Coefficient as none of the satisfaction scores were normally distributed.

Hierarchical regression model of questionnaire scores were then developed with the new factor scores using stepwise selection method to estimate any effect of satisfaction scores due to change in new factor scores. Probability of Removal was set equal to 0.10 and Probability of Entry was 0.05.

Mann – Whitney U test was performed to determine the effect of demographical variables with two categories on these scores. For determining the effect of demographical variables which had more than two categories on satisfaction scores, Kruskal Wallis test with post – hoc analysis was performed. P value less than 0.05 was considered to stipulate significant difference between the categories.

RESULTS

The return rate of questionnaire was 88.8% as only 200 participated (in which 109 were male and 91 were female nurses), 20 of them had regretted their availability while 05 of them had not reported their response in defined manner hence they were excluded from the study.

A total of 200 nursing care providers were interviewed among them 45% were females. About half of the participants were from 25-50 year age group and 22% were over 50 years. Sixty four percent of them were married. Only 15% of respondents had graduated. Around, one-fourth of the population had income less than 10,000 PKR. (Fig. 1)

The overall nursing workplace satisfaction score was 56.05 ± 6.81 which was partitioned in enjoyment score of 20.39 ± 4.36 , workplace satisfaction score of 24.42 ± 3.83 and colleague perception score of 11.24 ± 2.50 .

Principal axis factor analysis using varimax rotation retained six factors. The newly constructed variables were named as pleasure with job, mental relaxation, workplace communication, workplace learning environment, workplace support and workplace dependency. These variables are considered as most

important satisfaction factors which can describe the data very well. The details of these factors with respective loadings are described in table 1.

The mean scores of the retained factors were 17.04 ± 3.94 , 5.47 ± 1.85 , 12.10 ± 2.46 , 6.34 ± 1.87 , 6.28 ± 1.79 and 5.31 ± 1.73 respectively. Enjoyment score was strongly associated with the factor pleasure with job. Job satisfaction and perception with colleague was moderately associated with mental relaxation. Workplace communication and workplace support also yield moderate correlation with job satisfaction. On the other hand, workplace learning and workplace dependency produced significant correlation with perception with colleague scores. (Table 2)

Stepwise linear regression model was run to estimate the satisfaction score based on extracted factors. The estimated models have been displayed in Table 3. All the factors have more or less same significant effect on nursing workplace satisfaction. Nonetheless, with one score increase in pleasure with job, enjoyment score increased to 1.03 score whereas workplace communication and mental relaxation caused 0.343 and 0.105 increase of enjoyment score respectively. Workplace support caused highest positive effect on job satisfaction. Likewise, positive perception with colleague was highly influenced due to increment in workplace learning. The values of R-Square for these models are 0.984, 0.940, 0.592 and 0.427 respectively which show that the first two models are best fitted for the data whereas other two models are also good fitted for the data explaining significant information of the satisfaction.

The effect of demographical characteristics on the questionnaire based and extracted satisfaction scores is displayed in Table 4. Females and unmarried respondents had less workplace support (P values 0.046 and 0.027 respectively). It was noted that participants with age groups less than 25 stated to enjoy their job less whereas those who are too young or too old were less satisfied with their job. The overall nursing workplace satisfaction of these groups were also lower than the middle aged groups. Interestingly, it was also found that participants with higher degree were less satisfied, enjoyed and pleased with job and also had less workplace communications. They had also least workplace dependency. Customarily, respondents with less education had highest workplace communication. They also reported least workplace dependency in their professional lives. Participants having lower salary enjoyed and pleased with job more than those who had higher salary (P values 0.038 and 0.058 respectively).

Table 1: Factor Loadings for Nursing Satisfaction Questions in Principal Axis Factor Analysis:

Questions Labels	Extracted Satisfaction Factors Loadings					
	Pleasure with Job	Mental Relaxation	Workplace Communication	Workplace Learning Environment	Workplace Support	Workplace Dependency
My job gives me a lot of satisfaction	0.633					
I am enthusiastic about my present work	0.616					
My work gives me an opportunity to show what I'm worth	0.676					
In the last year, my work has grown more interesting	0.434					
Its worthwhile to make an effort in my job	0.408					
I have enough time to deliver good care to patients	0.467					
I would function better if it was less busy on the ward		0.632				
I feel that my colleagues like me		0.580				
I have enough opportunity to discuss patient problems with colleagues			0.513			
My job is very meaningful for me			-0.403			
I feel isolated from my colleagues at work			0.485			
I like my colleagues			-0.590			
I feel able to learn on the job				0.526		
It's possible for me to make good friends among my colleagues				0.457		
I have enough support from colleagues					0.586	
I like the way my ward is run					0.326	
I feel confident as a clinician						-0.577
I feel that I belong to a team						0.459

Fig. 1: Demographic Characteristics of Nursing Care Providers

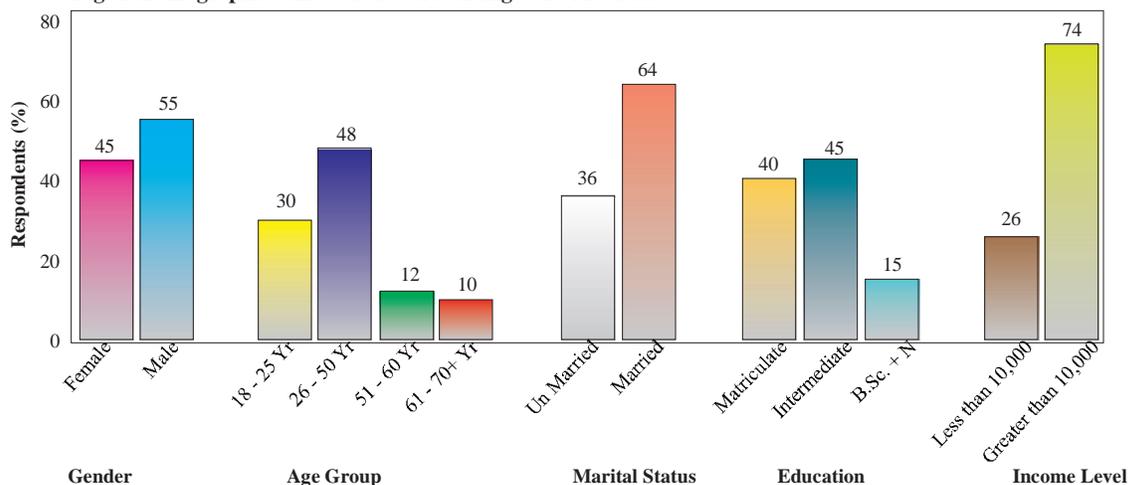


Table 2: Descriptive Statistics and Correlation of Extracted Factors and Sectioned Factors

Satisfaction Scores	Mean	Standard Deviation	Enjoyment Scores	Job Satisfaction	Perception with Colleagues
Pleasure with Job	17.04	3.940	0.947	0.162	-0.006
			<0.0001	0.022	0.931
Mental Relaxation	5.47	1.851	0.063	0.355	0.358
			0.372	0.000	<0.0001
Workplace Communication	12.10	2.459	0.220	0.308	0.237
			0.002	<0.0001	0.001
Workplace Learning Environment	6.34	1.871	-0.007	0.228	0.392
			0.922	0.001	<0.0001
Workplace Support	6.29	1.792	0.010	0.426	-0.054
			0.886	<0.0001	0.446
Workplace Dependency	5.32	1.729	0.103	0.252	0.361
			0.146	<0.0001	<0.0001

Table 3: Regression Models for Effects of Extracted Factors on Different Satisfaction Scores

Regression Models		B	Std. Error	P Values	R Square
Nursing Workplace Satisfaction	Pleasure with Job	1.080	0.022	<0.0001	0.984
	Workplace Communication	1.028	0.036	<0.0001	
	Mental Relaxation	1.056	0.048	<0.0001	
	Workplace Support	1.089	0.049	<0.0001	
	Workplace Learning Environment	1.080	0.047	<0.0001	
	Workplace Dependency	1.040	0.051	<0.0001	
Enjoyment Status	Pleasure with Job	1.031	0.019	<0.0001	0.940
	Workplace Communication	0.343	0.031	<0.0001	
	Mental Relaxation	0.105	0.041	0.012	
Job Satisfaction	Workplace Support	1.120	0.099	<0.0001	0.592
	Mental Relaxation	0.606	0.097	<0.001	
	Workplace Communication	0.449	0.073	<0.001	
	Workplace Learning Environment	0.549	0.096	<0.001	
	Workplace Dependency	0.513	0.104	<0.001	
	Pleasure with Job	0.099	0.045	0.031	
Perception with Colleague	Workplace Learning Environment	0.538	0.073	<0.0001	0.427
	Self Assessment	0.477	0.079	<0.001	
	Workplace Dependency	0.345	0.074	<0.001	
	Workplace Communication	0.235	0.056	<0.0001	

Table 4: Effect of Demographic Variables on Sectioned and Extracted Satisfaction

Demographic Characteristics*		Nursing Workplace Satisfaction	Enjoyment Status	Job Satisfaction	Perception with Colleagues	Pleasure with Job	Mental Relaxation	Workplace Communication	Workplace Learning Environment	Workplace Support	Workplace Dependency
Gender	Female	55.04 ± 7.88	19.99 ± 5.17	23.82 ± 3.91	11.23 ± 2.49	16.47 ± 4.38	5.26 ± 1.85	12.11 ± 2.54	6.59 ± 1.81	6.0 ± 1.72	5.08 ± 1.72
	Male	56.88 ± 5.68	20.72 ± 3.55	24.92 ± 3.25	11.25 ± 2.51	17.52 ± 3.48	5.64 ± 1.84	12.08 ± 2.40	6.13 ± 1.90	6.52 ± 1.82	5.51 ± 1.72
		0.093	0.664	0.106	0.739	0.121	0.137	0.820	0.095	0.046	0.079
Age Groups (Yr)	18-25	53.10 ± 6.70a	18.36 ± 4.15a	23.25 ± 3.63a	11.49 ± 1.99	14.98 ± 3.64a	5.41 ± 1.99	11.64 ± 2.32	6.36 ± 1.80	6.41 ± 1.92	5.19 ± 1.61
	26-50	56.94 ± 7.07b	20.84 ± 4.29ab	24.94 ± 3.79ab	11.16 ± 2.74	17.53 ± 3.78b	5.42 ± 1.76	12.48 ± 2.71	6.36 ± 1.95	6.22 ± 1.75	5.12 ± 1.66
	51-60	59.08 ± 6.26b	22.08 ± 4.42b	25.84 ± 3.44b	11.16 ± 2.72	19.04 ± 3.93b	5.48 ± 1.92	11.68 ± 2.12	6.44 ± 1.85	6.64 ± 1.47	6.16 ± 1.84
	> 60	56.67 ± 5.62ab	22.0 ± 3.24b	23.67 ± 4.26ab	11.0 ± 2.47	18.29 ± 3.21b	5.86 ± 1.85	12.10 ± 1.79	6.10 ± 1.87	5.81 ± 1.96	5.57 ± 2.01
			<0.0001	<0.0001	0.020	0.844	<0.0001	0.694	0.208	0.955	0.295
Marital Status	Unmarried	55.03 ± 6.53	19.84 ± 4.19	24.08 ± 4.10	11.11 ± 2.39	16.38 ± 3.99	5.27 ± 1.87	12.22 ± 2.17	6.21 ± 1.82	6.62 ± 1.62	5.14 ± 1.60
	Married	56.63 ± 6.93	20.70 ± 4.45	24.61 ± 3.68	11.31 ± 2.56	17.43 ± 3.87	5.58 ± 1.84	12.02 ± 2.62	6.42 ± 1.90	6.09 ± 1.86	5.42 ± 1.80
			0.162	0.138	0.358	0.495	0.081	0.244	0.499	0.409	0.027
Education Status	Matriculate	58.01 ± 5.60a	21.98 ± 3.26a	24.80 ± 3.70	11.24 ± 2.48	18.59 ± 3.18a	5.59 ± 1.73	12.01 ± 2.30ab	6.19 ± 1.95	6.49 ± 1.74	5.59 ± 1.76a
	Intermediate	57.01 ± 6.24a	21.34 ± 3.27a	24.30 ± 4.17	11.37 ± 2.48	17.67 ± 3.09a	5.54 ± 1.98	12.51 ± 2.51a	6.57 ± 1.80	5.99 ± 1.86	5.28 ± 1.64ab
	B.Sc. N	47.90 ± 5.59b	13.27 ± 2.59b	23.77 ± 3.06	10.87 ± 2.62	11.07 ± 2.23b	4.93 ± 1.70	11.07 ± 2.48b	6.07 ± 1.86	6.63 ± 1.63	4.70 ± 1.80b
			<0.0001	<0.0001	0.585	0.684	<0.0001	0.254	0.031	0.244	0.178
Income Level (PKR)	≤10,000	56.92 ± 5.97	21.63 ± 3.36	24.44 ± 3.72	10.85 ± 2.54	18.08 ± 3.09	5.75 ± 1.78	11.88 ± 2.49	6.27 ± 1.94	6.13 ± 2.096	5.25 ± 1.62
	>10,000	55.74 ± 7.08	19.95 ± 4.60	24.41 ± 3.88	11.38 ± 2.48	16.68 ± 4.15	5.37 ± 1.87	12.17 ± 2.45	6.36 ± 1.85	6.34 ± 1.676	5.34 ± 1.77
			0.336	0.038	0.883	0.184	0.058	0.114	0.57	0.668	0.468

DISCUSSION

Workplace satisfaction is considered as one of the characteristic features of good quality job in any profession as it directly correlates the employees' job commitment and loyalty with their professions.⁵ The primary objective of this study was to explore and interlink the different job satisfaction variables like pleasure with job, mental relaxation, workplace communication, workplace learning environment, workplace support and workplace dependency on different factors like age groups, gender, educational status and on earning status of nursing care providers at different tertiary care hospitals of Karachi.

Scarcity of qualified nurses is among one of the global issues,¹⁵ Pakistan also faces the same challenge, the findings of this survey (i.e., 15% graduate respondents) directly supports the unavailability or shortage of qualified nurses. Majority of professionals have reported salary structure greater than the baseline common men income (Rs.10,000/-), imperatively some past findings associated low salary structure as a big contributor of workplace dissatisfaction,¹⁶ in contrast the findings of this study reveal that those nursing care providers who have low salary output are more pleased with their professional responsibilities in comparison with those who had higher salary packages, this finding strengthens the concept that workplace satisfaction will not directly be gauged with the financial incentives but workplace satisfaction is something about the opportunities or hope that human resource have of what their profession should make them easily accessible.⁹

The demographic findings also elaborate that female and unmarried respondents had less workplace support as compared with other categories of respondents. Regarding the factorial analysis of extracted satisfaction factors loading, our findings indicate that enjoyment score was strongly associated with pleasure with job, job satisfaction and perception with colleagues was moderately associated with mental relaxation. Workplace communication and workplace support also yield moderate correlation with job satisfaction. Workplace learning and workplace dependency was also significantly related with perception with colleagues. We also found out that workplace support caused highest positive impact on job satisfaction and positive perception with colleagues with healthier workplace learning. Studies also suggested that the more the workplace support the more satisfaction with job an employee has, with improved professional communication environment, ultimately enhances the employees' and organizational productivity.⁷

The values of linear regression model (R values) for extracted factors showed that nursing workplace satisfaction and enjoyment status provides best information of nursing care providers' satisfaction, whereas job satisfaction and perception with colleagues also provide good information, which depicts that participants with higher educational status were less satisfied, enjoyed and pleased with job and also had less workplace communications. Workplace support and satisfaction with job are two important elements of any profession, as the employees of healthcare organizations have a much workload on their shoulder with full attention demanded, therefore gradual assessment of satisfaction level is an important element to improve the healthcare structure and facilities and employees' commitment also.²⁶ Workplace satisfaction in nursing profession can be agitated by variable causes like intense workload, lack of appreciation from management, strict policies and regulation, unavailability of training programs etc,¹⁶ by overcoming these barriers, management can improve level of satisfaction by adopting policies and strategies that favors workload management and time management to reduce work-related stress and maintain the effort reward balance.²⁴

CONCLUSIONS

The study findings concluded that perception of nursing caregivers varied with respect to the different workplace environment, the level of responsibilities and individual job descriptions. Profession especially associated with healthcare services, financial rewards are not the only satisfaction factor that encourage the level of satisfaction in employees and boost the working standard, but continuous appreciation, timely motivation from all concerned stake holders and smooth consistent environment for working will enhance the productive capacity and performance of healthcare professionals.

LIMITATIONS

The current study has few limitations, the major one includes lack of research and survey studies in the concerned field, so difficult to compare the output in Pakistan. Language difference while dealing with the respondents was a major barrier.

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Prevalence of Medical Problems in Dental Out Patients in Karachi

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ABSTRACT

Objectives: To investigate the prevalence of patients suffering from medical conditions who present at the dental hospital seeking treatment for their dental problems and to explore the association of gender with medically compromised dental patients.

Materials and Methods: This is a retrospective study. The records of a total of 3087 patients reporting at the outpatient of Dr. Ishrat-ul-Ebad Khan Institute of Oral Health Sciences from 1st January to 31st March 2011 were reviewed for the presence of medically compromised conditions. Medically compromised conditions were categorized into eight modalities like cardiovascular diseases, asthma, anemia, liver diseases, endocrine disorders, renal diseases, epilepsy and infectious diseases.

Results: Out of 3087 patients; 426 (13.7%) patients were suffering from different medical conditions. The age range of the recorded patients was 1-90 years with a mean age of 34.14 (S.D \pm 16.07 Years). One hundred and eight (43%) males and 246 (57%) females were attending the OPD (DIKIOHS) making male to female ratio 1- 1.36. Among them cardiovascular diseases 387 (90.81%) were the most prevalent, followed by endocrine disorder 188 (44.13%), liver disease 49 (11.50%), renal diseases 81 (19.01%), anemia 77(18.07%), asthma 75 (17.62%), infections 43 (10.09%), and epilepsy 16 (3.75%).

Conclusion: Despite the fact that prevalence of medically compromised conditions in dental patients is not high, dentists should go through history form and perform careful clinical examination before starting any dental treatment. We recommend that dental students must be trained adequately to deal with medically compromised patients and be also able to deal with medical emergencies.

Key words: Medically compromised patient, dental treatment, emergency management .

INTRODUCTION

Better access to the health care facilities around the globe together with tremendous scientific advancement in recent years has enabled people to live longer with better oral hygiene as reported from many countries.¹⁻² As a result, dental clinics are anticipating to treat more elderly patients with intact dentition as the number of elderly patients increases the chances of treating patients with medical condition also increases, it is therefore necessary for dentist to know the effects of dental treatment on these medical conditions and the complications that can take place.³⁻⁵

The objective of this study was to investigate the prevalence of patients suffering from medical conditions who present at dental hospitals seeking treatment for their dental problems and to explore the association of gender with medically compromised dental patients.

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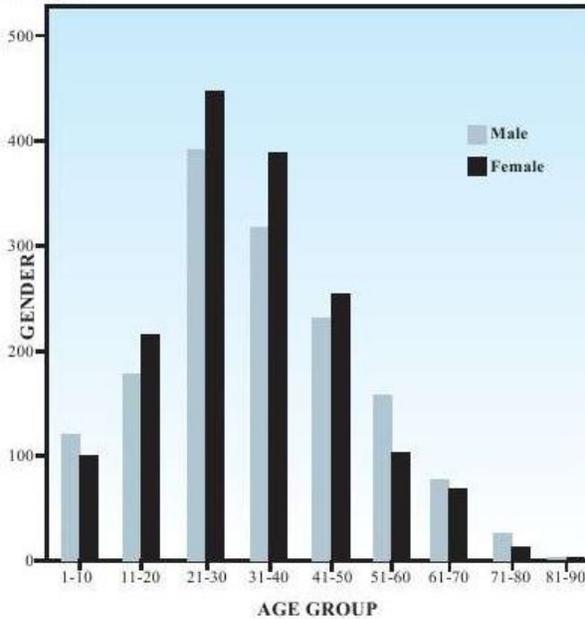
MATERIAL AND METHODS:

This is a retrospective study in which the records of patients attending dental outpatient of Dr. Ishrat ul Ebad khan Institute of Oral Health Sciences (DIKIOHS) in the first quarter of 2011 from 1st January to 31st march were retrieved and analyzed for medical conditions. The sample size of 3087 was achieved by including all patients attending OPD of DIKIOHS. The hospital standardized history form was used to retrieve data on demographics and medical conditions present in patients attending outpatient of Dr. Ishrat ul Ebad khan Institute of Oral Health Sciences (e.g. Cardiovascular diseases, anemia, endocrine disorders, asthma, liver diseases, renal diseases, infections and epilepsy). The data was entered on SPSS version 16.0. The data was analyzed by using descriptive statistics. Frequency distribution, mean and standard deviation of each variable was computed. Chi-square test was being used to establish associations. A p-value less than 0.05 was considered statistically significant. All diseases were recorded individually as a single entity even if they existed together in a single patient. If any entry in the record like age, sex, or medical condition was not properly entered, they were excluded.

Table 1: Frequency Distribution of Different Medical Condition in Dental Patients

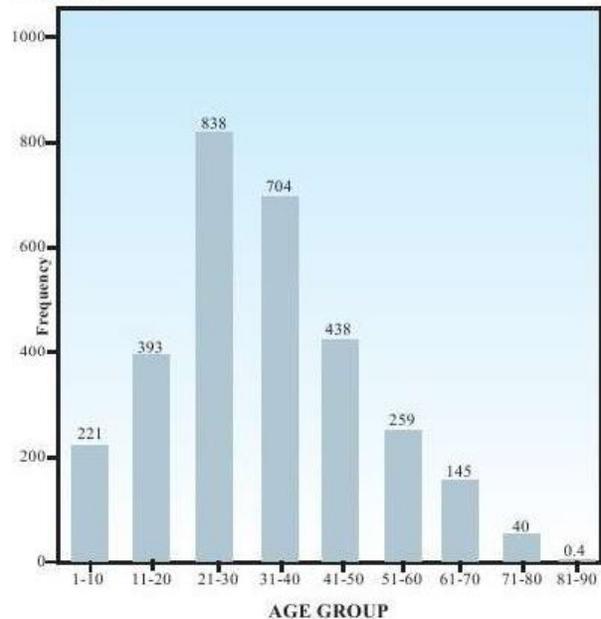
S.No.	Diseases	Total Patients	Males Total	Females Total	Male To Female Ratio	Male To Female Ratio
1.	Cardio Vascular Diseases	387	132	237	1:1.58	1:1.58
2.	Endocrine Disorder	188	72	116	1:1.61	1:1.61
3.	Renal	80	45	35	1:1.28	1:1.28
4.	Anemia	77	16	61	1:3.81	1:3.81
5.	Asthma	74	32	42	1:1.31	1:1.31
6.	Infection	43	19	24	1:1.26	1:1.26
7.	Epilepsy	17	10	7	1:0.7	1:0.7
8.	Liver Disease	14	9	5	1:0.5	1:0.5

Figure 1: Gender Distribution of Medical Conditions in Different Age Groups



The above mentioned figure1, showed the prevalence of different medical condition in different age groups. It revealed that as the age increases the prevalence of medical conditions are also increasing especially among females. This trend was observed during 2nd, 3rd, 4th and 5th decades of life and was reverse during 6th, 7th and 8th decades of life.

Figure 2: Frequency Distribution of Medical Conditions in Different Age Groups



The above mentioned figure showed the distribution of different medical conditions among various age groups. It was observed that different medical conditions were mostly prevalent in 3rd and 4th decade of life.

RESULTS

In the first quarter of the year 2011 from 1st Jan to 31st March, record of a total of 3,087 patients was retrieved. The age of the recorded patients ranged from 1 year to 90 years mean age was 34.14 year with standard deviation \pm 16.07 years. Out of three thousands and eighty seven, 426 (13.79%) patients were presenting with different medical conditions. There were 180 (43%) males and 246 (57%) females, the male to female ratio was 1:1.36. The number of female patients who had medically compromised conditions was statistically higher than that of male patients ($p=0.000$). In almost all categories of medical conditions females were

presenting more than males except for renal diseases. Among them cardiovascular diseases 387 (90.81%) were the most prevalent, followed by endocrine disorder 188 (44.13%), renal diseases 80 (19.01%), anemia 77(18.07%), asthma 75 (17.62%), infections 43 (10.09%), epilepsy 16 (3.75), liver disease 14 (3.2%) In cardiovascular diseases, Hypertension was the most commonly encountered disease entity accounting for 312 (73.23%) patients, followed by diabetes 162 (38.02%) patients.

The majority of medically compromised patients were in their 3rd and 4th decade (Figure 1).

DISCUSSION

Due to the fact that the population is getting older and to new medical and dental techniques, the number of medical complications during treatment is tending to increase. In order to avoid these complications a correct clinical history should be obtained of all these patients.⁶ In this study there were 426 patients amounting to 13.79% who were classified as medically compromised. This study results were similar to the study conducted by Kittipong in 2009 which showed 12.2% medically compromised patients.⁷ The reason for this might be due to the fact that both studies recruited patients across a wide age range rather than emphasizing on older age group patients.

Smeets et al revealed that prevalence of medically compromised patients from the survey of dental patients to be 28.2%. Saengsiravin et al reported in dental patients the prevalence of medical conditions to be 55.45%. Smeets et al and Saengsiravin et al study results were contrary to this study results which showed 13.79% medically compromised patient results.⁸⁻⁹ Other researchers found a range from 24.60% to 68.5% which is higher than this study results.¹⁰⁻¹²

There can be many reasons attributed to this, firstly in developing countries such as Pakistan most of the patients do not undergo routine medical check-ups. As a consequence, patients harbor asymptomatic medically compromised conditions without realizing the fact that they have medically compromised conditions.⁷ The other important factor is that this study relied on the history from entries of people who are not aware of what medicine they are taking and for which disease therefore they were unable to communicate as effectively as people in developed world where similar studies were conducted.

Cardio Vascular systemic disease and endocrinological disorders were the most common conditions in this study; 90.61% and 44.13% respectively. This study results were in accordance to Steel results which confirms the established fact that they are the most commonly occurring disease of the elderly population the world over.¹ Hypertension in cardio vascular diseases and diabetes mellitus in endocrine disorders were the first and second most common conditions in our study followed by others.

Chandler reported that second most frequent medical risk related history group suffered from drug-related allergy. These findings are contrary to this study results which showed the endocrinological disorders especially diabetes mellitus as the second most common medically compromised condition in dental patients.⁶

More females were medically compromised than males in this study as evident from male to female ratio 1:1.36. This study results were in accordance to Kittipong results which showed female preponderance with a ratio of (female: male ratio=1.5:1).⁷ This study also showed an interesting fact that as the age increases the prevalence of medical conditions were also increased especially among females. This trend was observed during 2nd, 3rd, 4th and 5th decades of life and was reverse during 6th, 7th and 8th decades of life. The reason might be that females in child bearing age have obstetrics checkups therefore any underline medical condition is documented.

As the number of medically compromised patients reporting for dental treatment is increasing, this study will help to prepare dental surgeons for taking care of this segment of patient population. The first step should be proper meaningful history taking so that medical conditions are not missed out. Care must be taken that they are properly recorded.^{6,13-14}

Training of dental students and continuing dental education for dentists in the management of dental treatment for medically compromised patients should be made mandatory part of dental curriculum as the literature shows concern about the ability of dentists to handle medical emergency¹⁵⁻¹⁷ together with this, special treatment areas must be set so as to reduce anxiety specially for hypertensive patients and special consideration must be given to patients recovering from myocardial infarction.¹⁸⁻²⁰

In order to obtain more reliable results, it is necessary to conduct further studies. It would be advisable to evaluate greater number of patients at different dental hospitals for longer period. It is important to include other variables such as; socio economic status, detailed cardio vascular systemic disease with stages and including other endocrinological disorders, and different types of allergies.

CONCLUSION

Within the limitation of this study the conclusion drawn is that the Medical risk related history can play an important role in adapting dental treatment according to specific medical conditions of patient. This is especially important in the case of elderly patients. Importantly dentist must be trained to take proper history, must be aware of the medications used by the patients, The treatment area must be equipped with all facilities needed to manage medical emergencies especially cardiac emergencies.

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Evaluation Method of Bonding To Root Canal Dentin After Sodium Hypochlorite Treatment*

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ABSTRACT

Statement of the problem: Shear bond strength test is a common test to evaluate the bond between restorative materials and tooth structure but it cannot measure the marginal adaptation of the restorative filling materials. Therefore, in this research an evaluation method of punch out test was employed to evaluate resin bonding to root canal wall dentin by measuring both marginal adaptation and shear bond strength simultaneously.

Objectives: The aim of this study is to investigate the reliability and efficiency of punch out shear test to evaluate the effect of sodium hypochlorite (NaOCl) as a root canal irrigant on composite resin bonding to canal dentin and also to evaluate the contraction gap formation from the same specimen. The null hypothesis tested was that treatment of root canal with NaOCl would not compromise bonding to root canal dentin, whether a total etching adhesive or self-etching adhesive was used.

Materials and Methods: A total etching adhesive system (Optibond Solo Plus) and a self etching adhesive system (XenoIII) were employed in this study. A standardized truncated cone cavity (4 mm in base diameter, 3 mm in depth and a convergence angle of 5°), was prepared at the top portion of the root canal. The cavities were subjected to sodium hypochlorite treatment for different periods of time and then rinsed with distilled water. Then, one of the aforementioned dentin bonding systems was applied to the cavity walls according to the manufacturer's instructions. The cavities were then filled with a micro-hybrid composite resin.

Results and conclusion: The increase in the NaOCl application time resulted in a progressive decrease in the punch out shear bond strength for the specimens treated with a self etching adhesive system. A marginal gap was detected when XenoIII was applied after NaOCl application.

Key words: Root canal dentin, self adhesive, sodium hypochlorite, punch out shear bond strength.

INTRODUCTION

The most appropriate kind of mechanical testing regime for evaluating restorative materials has not been agreed amongst the international community responsible for developing standard tests for these products. Recently, a shear punch test has been advocated¹ as it has certain advantages over more traditional compressive and flexural tests. The shear punch test has previously been used in standards testing.²⁻³

Restorations for endodontically treated teeth are designed to replace the missing tooth structure and to protect the remaining structure from fracture. Guzy et al.⁴ reported that preservation of the structure of endodontically treated teeth is an important factor to prolong the longevity of these teeth.⁴ In addition, it is essential to minimize the amount of tooth structure

loss for a favorable prognosis.⁵ A good performance of the resin bonding system to the tooth structure is essential to restore the tooth after root canal treatment.⁶

The reliability and predictability of resin bonding to enamel are well established. However, those to dentin are still questionable because dentin has greater organic contents than enamel.⁷ Moreover, both the composition and morphology of deep dentin are different from those of superficial dentin. For example, the hardness of deep dentin is less than that of superficial dentin,⁸ the density and diameter of dentinal tubules of deep dentin are greater and thicker, respectively, compared with superficial dentin. The calcification of deep dentin is not as mature as that of superficial dentin.⁶ Therefore, bond strength to deep dentin has been reported to be lower than that of superficial dentin.⁹⁻¹⁰ In addition, deep dentin and root canal wall dentin might be affected by root canal irrigants and disinfectants during endodontic treatment. Sodium hypochlorite (NaOCl) is one of the most common root canal irrigants used for debridement lubrication, destruction of microbes and dissolution of organic tissues.¹¹⁻¹²

Several researchers¹³⁻¹⁴ have studied the role of NaOCl in dentin permeability and dentin adhesion. Depending on each testing methodology and/or specific composition of each dentin adhesive, the application of NaOCl as a

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root canal irrigant may increase or decrease bond strengths of composite resin bonding to tooth structure.¹⁵⁻²⁰ Nikaido and Perdigao¹⁶⁻¹⁷ reported that NaOCl treatment interfered with the adhesive of the bonding system to dentin and compromise composite bonding. Whereas Inoue et al.²¹ reported that NaOCl treatment improved the adhesion of the bonding system to dentin when phosphoric acid etchant is used to remove the smear layer.

The previous studies investigating the effect of NaOCl on resin bonding systems to tooth structure have produced controversial results. Therefore, the effects of NaOCl treatment on dentin have not clearly been confirmed. The shear punch test has previously been used in standards testing² and has been suggested as a suitable method for evaluating dental cements.²²⁻²³

In this study, an evaluation method for resin bonding to root canal dentin was conducted which measures both marginal adaptation and punch out shear bond strength simultaneously using the same specimen. The reliability and efficiency of this method were investigated in an effort to examine the effects of NaOCl as a root canal irrigant on resin bonding to root dentin when a total etching adhesive or a self-etching adhesive was used.

MATERIALS AND METHODS

One hundred extracted bovine mandibular incisors were used in this study. The teeth were stored in 0.5% chloramines solution at 4°C. Roots with a standardized dimension were only selected. Two dentin bonding systems; a self-priming adhesive system containing both the primer and adhesive in one bottle, utilizing the total etching technique (Optibond Solo Plus) and a self-etching adhesive system (Xeno® III), were employed in this study as shown in Table 1.

Cavity preparation

The teeth were cleaned of debris with periodontal curettes and stored in distilled water. The crowns of the teeth were removed with a diamond disk at the cement-enamel junction. The pulp tissues were removed using a dental file (#30, Maillefer, Ballaigues, Switzerland) without root canal preparation. Each root was embedded in the center of an acrylic pipe (diameter: 16 mm, depth: 25 mm) with a chemically cured acrylic resin, Trayresin (Dentsply Trubyte, York, PA). A 3 mm thick coronal surface was resected with a low-speed diamond saw (Isomet 2000, Buehler, Lake Bluff, IL, USA). Then, the root canal space was filled with a thermoplasticized gutta-percha delivery system (Obtura H, Obtura, Fenton, Mo, USA) and a resin sealer (AH-26; DeTrey, Zurich, Switzerland). A standardized

truncated cone cavity²³ (4 mm in base diameter, 3 mm in depth and a convergence angle of 5°), was prepared at the top portion of the root canal using a milling apparatus (KAVO EWL, K9-Milling apparatus Type 990) and a tapered end drill 4mm in diameter (040, Hager&Meisinger GmbH) under a water coolant (Fig.1). The long axis of the drill was directed parallel to the long axis of the root canal. All cavities were rinsed with distilled water using a three-way syringe.

Preparation of surface for adhesion

5% solution of sodium hypochlorite was selected as a root canal irrigant. Its effects on the aforementioned dentin bonding systems to root canal dentin were examined. Specimens were randomly assigned to 2 major groups of 50 teeth each according to the adhesive systems employed and then each main group was subdivided to five subgroups according to NaOCl treatment as follows:

- Group A, neither NaOCl treatment nor bonding system;
- Group B, bonding system without NaOCl treatment;
- Group C, NaOCl for 1 min and bonding system;
- Group D, NaOCl for 5 min and bonding system;
- Group E, NaOCl for 10 min and bonding system.

After a designated period of NaOCl treatment, each cavity was rinsed with distilled water for 10s and one of the aforementioned dentin adhesive systems was applied according to a certain application protocol as mentioned in table 2.

After application of different adhesive systems to cavity walls, a hybrid composite resin (Z250, 3M) was filled in the cavity and photo-polymerized using a light-curing unit (Elipar 2500, 3M ESPE, St Paul, MN-Germany) for 40 s.

Observation of marginal adaptation and gap

Immediately after the resin filling, the tooth surface in the acrylic pipe was ground flat with a series of silicon carbide abrasive paper (#320, #500 and # 1000) under running water. After polishing, the specimens of each test group were immersed for 24 hours at 37°C in a 0.2% fuchsine solution. Then, specimens surfaces were rinsed with distilled water and dried prior to the microscopic examinations.

Marginal gap of the composite inside root canal dentin was investigated with a Nikon, stereoscopic Zoom Microscope SMZ/1000 equipped with digital camera DXM1200F at 20 x magnification. A software version 2.63 (Nikon Corporation, Japan) was installed for measurement of the gap. When fuchsine penetration was observed anywhere around the margin of a specimen, it was defined as a gap positive.

Measurement of punch out shear bond strength

After the contraction gap observation, all specimens were kept in distilled water at 37°C for 24h. A superficial 2.0 mm coronal layer of each specimen was sectioned with a low-speed diamond saw (Isomet 2000, Buehler, Lake Bluff, IL, USA). The thickness of the sectioned specimen and the diameter of the resin-filled cavity were measured using a digital micrometer (Fowler, Cole-Parmer Instrument Co.) with 0.001 mm precision.

Each sliced specimen was positioned and centered on a metal platform for the punch out shear bond strength test (Fig. 2, 3). The load was applied by a cylindrical steel plunger of 2.8 mm diameter attached to the upper jig of the universal testing machine. The metal platform had a round central hole (5.0 mm in diameter) which is larger than the root canal diameter. The most coronal side of the specimen is placed downwards. The load was applied by the plunger from the apical side of the specimen. The plunger was centered over the composite filling inducing shear stresses along root dentin/composite interface. The initial dislodgement load by which the filled resin was punched out from the root canal wall cavity was measured using a universal testing machine (Instron testing machine 8500; Norwood, MA, USA) at a crosshead speed of 1.0 mm/min. In order to express the bond strength (δ) in MPa, the load at failure recorded in Newton was divided by the area of the bonded interface, which was calculated through the following formula: $\delta = F/A$

Where, F = load for specimen failure (N).

A = bonded area (approximately 27 mm²).

To calculate the bonded area (A), a formula was applied to calculate the lateral area of the conical geometric figure of prepared cavity in the root canal that formed a circular straight cone trunk of parallel bases. The formula used for the area calculation was: $A = \pi XgX (R1 + R2)$

Where, $\pi = 3.14$, g = trunk generatrix, R1= smaller base radius, R2= larger base radius (Fig.4).

For the conical trunk generatrix (g) calculation the Pythagorean theorem (the square on the Hypotenuse is equal to the sum of the squares on the other two sides) was used as expressed in the following formula: $g^2 = h^2 + [R2 - R1]^2$

Where, g = conical trunk generatrix, R1 and R2 were obtained by measuring the internal diameters of the smaller and larger base, respectively, corresponding to the internal diameter between the root canal walls.

Statistical Analysis

Occurrence of the gap formation was analyzed using the chi square test at a significant level of 5%. The mean punch-out shear bond strength values from each specimen were initially calculated. Considering each group was composed of ten specimens, then ten bond strength values of each group (n=10) were employed for statistical analysis using a one-way analysis of variance (ANOVA) and a post-hoc Tukey test, $\alpha = 0.05$. Statistical analysis of the data was performed using a soft ware program; SPSS version 12.

RESULTS

Results of gap formation.

The gap free ratio for the different bonding systems employed (Optibond and XenoIII) are illustrated in Figs. 5 and 6 respectively. All specimens of group A; whether Optibond or XenoIII was used, showed marginal gaps. In contrast, neither the specimens of groups B, C, D and E in which Optibond Solo Plus was applied nor specimens of group B in which XenoIII was applied, showed any marginal gaps. However, specimens of groups C, D and E in which XenoIII was applied, showed marginal gaps that were observed more frequently with longer treatment time of NaOCl. Group E demonstrated the highest percentage (88%) of marginal gap among the specimens in which XenoIII was used.

Marginal gap observation

Stereomicroscopic examination showed gap positive when XenoIII was employed after NaOCl treatment (Fig.7-A). Gap negative (gap free) was also observed in groups B, C, D, and E when OptiBond Solo is used (Fig.7-B).

Results of the punch out shear bond strength

Mean shear bond strength and standard deviation are shown in tables 3, 4 and Figures 8, 9. All specimens of group A, regardless the adhesive system employed, showed poor shear bond strengths (0.5 - 0.31 MPa). The bond strength values of Optibond for specimens of groups B, C, D and E were 10.1, 8.6, 10.8 and 9.8 MPa, respectively and they were significantly different from that of group A. There were no significant differences in the mean bond strength values among those groups.

The bond strength values of XenoIII for specimens of B and C were not significantly different from each other ($p = 0.086$). However, they were significantly different from D and E ($p < 0.05$).

On the other hand, the specimens treated with XenoIII showed significantly higher bond strength values than those treated with Optibond Solo ($p = 0.0001$).

Table 1. The adhesive systems employed in this study and their composition.

Adhesive system	Composition
Optobond Solo plus (self-priming adhesive system utilizing the total etching technique) Manufacturer: Kerr Corp, Orange, Calif.	Ethyl alcohol 20-25% Alkyl dimethacrylate resins 55-60% Barium aluminoborosilicate glass 5-10% Fumed silica (silicon dioxide) 5-10% Sodium hexafluorosilicate 0.5-1%
XenoIII® (Single step self-etching adhesive). Manufacturer: DENTSPLY DeTrey GmbH, Germany.	Liquid A -2-hydroxyethyl methacrylate (HEMA) -Purified water -Ethanol -Butylated hydroxy toluene(BHT) -Highly dispersed silicon dioxide Liquid B -Phosphoric acid modified methacrylate resins. -Mono fluoro phosphazene modified polymethacrylate. -Urethane dimethacrylate -Butylated hydroxy toluene(BHT) -Camphorquinone. -Ethyle-4- dimethylaminobenzoate.

Table 2. The application protocol of the adhesive systems.

Adhesive system	Application protocol
Optobond Solo Plus®	-Etch root canal dentin with 15 seconds with 37.5 phosphoric acid etch (kerr gel etchant). Rinse thoroughly for 15 second, then gently blown with compressed air to remove any excess water. Don't desiccate keeping the surface is moist. -Apply OptiBond Solo Plus with a light brushing motion for 15 seconds, then air thin for 3 seconds. -Light cure for 20 seconds. Place composite and light cure.
XenoIII®	-Dispense equal amounts of liquids A and B and mix them for 5 seconds. -Apply the mixture on the root canal dentin surface with a light brushing motion. Leave it for 20 seconds. -Air thinning until there is no more flow. -Light cure for 20 seconds. - Place and light cure composite.

Table 3. Mean and standard deviation of punch out shear strength values of specimens treated with NaOCl and Optibond Solo Plus. Means with different letter exponents are significantly different. (p<0.05)

Groups of Optibond Solo	Mean (MPa)	Standard deviation (±)
A	0.5(a)	0.2
B	10.1(b)	1.7
C	8.6(b)	2.3
D	10.8(b)	3.1
E	9.8(b)	2.2

Table 4. Mean and standard deviation of punch out shear strength values of specimens treated with NaOCl and XenoIII. Means with different letter exponents are significantly different. (p<0.05)

Groups of XenoIII	Mean (MPa)	Standard deviation (±)
A	0.3(a)	0.1
B	0.3(b)	1.9
C	4.8(b)	2.3
D	2.4(c)	1.0
E	1.28(c)	0.7

Fig.1. A specimen is embedded in acrylic resin and mounted on the Milling apparatus.



Fig .2. Diagrammatic representation of the set-up of punch out shear test

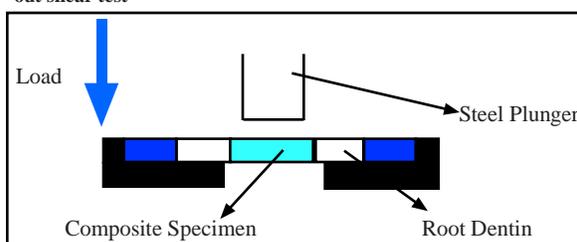


Fig.3. A specimen is mounted on the Instron testing machine with the plunger is centered over the specimen.

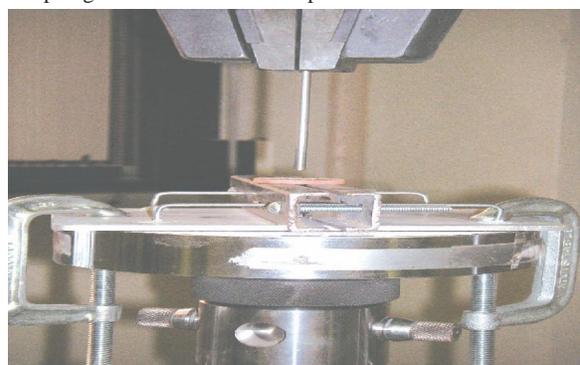


Fig.7. Stereomicroscopic images to identify the gap formation: A. represents a gap positive as indicated by arrow. B. represents a gap negative (gap free).

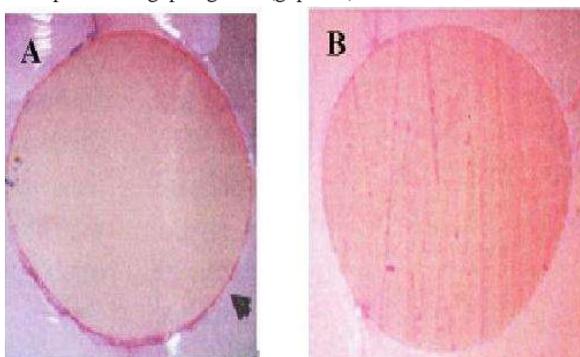


Fig.4. Schematic drawing that corresponds to the internal section of the canal walls, Geometric figure for calculation of the cone trunk.

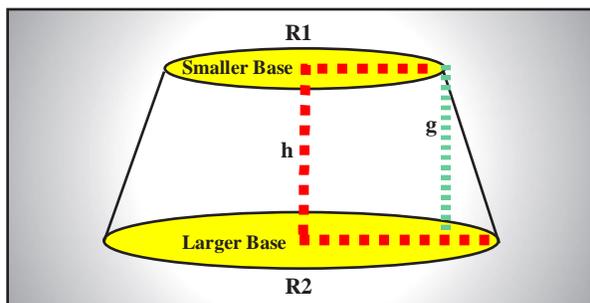


Fig.5. Histogram showing the gap free ratio of specimens treated with NaOCl and Optibond Solo Plus.

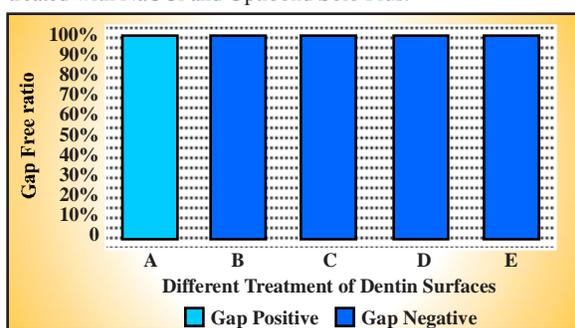
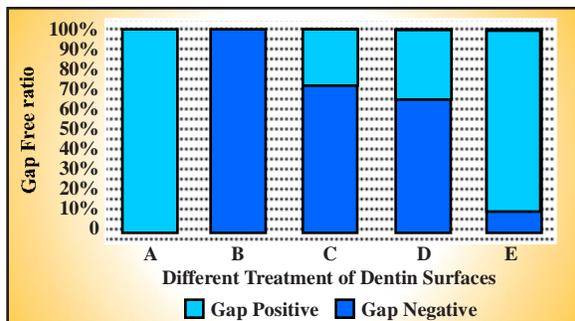


Fig.6. Histogram showing the gap free ratio of specimens treated with NaOCl and XenIII.



DISCUSSION

There are only a few studies^{17,24} that evaluated resin bonding efficiency to the root canal dentin or deep coronal dentin. In these studies, flat dentin surfaces were sectioned along the root and then cylindrical composite resin specimens were adhered to these surfaces for conventional shear bond strength evaluation. In the present study, the cavity was prepared inside the root canal dentin wall and the adhesive systems were applied from the pulpal side. In addition, almost all directions of the dentinal tubules were perpendicular to the cavity wall. The convergence angle of the prepared cavity was 5°, which was similar to that of a tapered fissure-bur for dowel space

Fig.8. Histogram showing punch out shear bond strength values of different dentin surfaces treated with NaOCl and Optibond Solo.

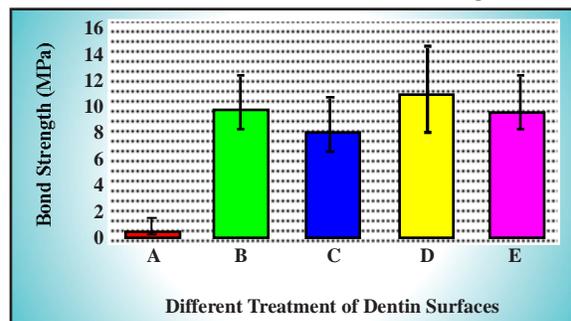


Fig.9. Histogram showing punch out shear bond strength values of different dentin surfaces treated with NaOCl and XenIII.

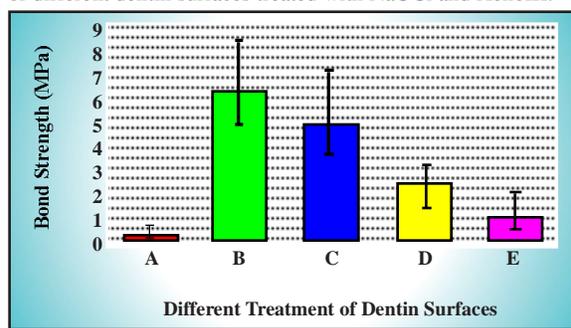
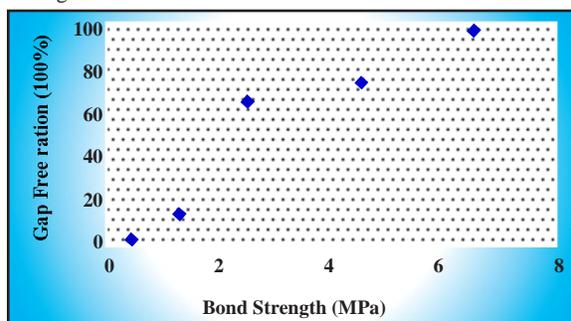


Fig.10. Relationship between the gap formation ratio and bond strength of XenIII at different treatments with NaOCl.



preparation. Therefore, the cavity preparation used was considered to be typical for composite resin restoration after root canal treatment. Perfect marginal adaptation of a composite resin to dentin is essential to avoid marginal discoloration and leakage. There are several methods to evaluate marginal adaptation, such as microleakage test and wall-to-wall gap observation in ISO/TR11405: 1994.²⁵ In the present study, the observation method of the contraction gap similar to ISO/TR11405: 1994 was employed. The tensile bond or shear bond test is generally employed to evaluate the resin bonding strength to dentin. However, the punch out shear bond test has been suggested to evaluate the shear strength of composites.²⁶

The experimental set-up of this study, could measure both marginal adaptation and shear bond strength using the same specimen. Moreover, it was possible to apply the load perpendicular to the cavity wall which consisted of root canal wall dentin. Therefore, this method could be employed to evaluate adhesion of luting materials for dowel post systems to the root canal wall. However, there are a few disadvantages in this method according to Nomoto et al.²⁷ For example, the results are influenced by the modulus of elasticity of the filling materials used; punch out bond strength is increased when a filling material with a low elastic modulus is employed because the filling material deforms during loading, which interferes with the pushout from the cavity.²⁶ Therefore, truncated cone cavities were employed in the present study to avoid interference caused by the filled material's deformation. The configuration of cavity preparation is an influential factor for wall-to-wall gap formation.

Recently, the "c-factor" was introduced to determine the cavity configuration effect on resin bond strength to dentin.^{10,28} The apical side of the prepared cavity was faced with gutta-percha which did not adhere to the composite resin in the present study. Therefore, the c-factor of the prepared cavity was calculated to be approximately 1.25; the value was similar to a class IV or III cavity, which might be favorable for resin bonding to dentin.²⁸

The dentin bonding systems used in the present study represent the total etching adhesive (Optibond SoloPlus) and self-etching adhesive (XenoIII). In the total etching system, the etchant removes the smear layer and demineralizes dentin, and the adhesive resin penetrates the etched dentin. However, the acid monomer of the self-etching adhesive mildly demineralizes dentin so that it does not remove smear plugs completely. At the same time, the primer component modifies the demineralized dentin and the bonding resin infiltrates the primed dentin.

Several studies reported on the marginal adaptation and bond strengths of total etching adhesive systems (Single Bond, 3M).^{17,29-34} Bond strengths obtained from these studies were reported to be in a range of 12.8-20.1 MPa. While in the present study, bond strength was lower than that obtained in previous studies, because those studies applied bonding systems to flat dentin surfaces and c-factor was smaller than that of the present study.

There have been several studies reporting the effects of endodontic irrigants on resin bonding systems. In particular, the effects of NaOCl have been thoroughly

discussed but not clearly confirmed. The loss of physical properties of NaOCl-treated dentin could not be reversed after resin infiltration. This may be due to a lack of proper interaction of the adhesive agent with the altered dentin substrate. Several studies reported a decrease in bond strength of Single Bond to NaOCl-treated dentin.³⁵⁻³⁶

In this study the shear bond strength was reduced with increasing the application time for sodium hypochlorite. This may be due to incomplete polymerization of the self-etching adhesive and to reduced mechanical properties of the infiltrated resin. The presence of reactive residual free-radicals as a result of the oxidizing action of NaOCl, may compete with the propagating vinyl free-radicals generated during light-activation of the adhesive, resulting in premature chain termination and incomplete polymerization.^{18,24}

This is the most likely phenomenon that occurred in this study; the inability of the infiltrating resin to recover the strength of the NaOCl-treated dentin was probably caused by its incomplete polymerization reaction as results of presence of residual NaOCl and the presence of oxygen may interfere with the polymerization of the bonding resin.

The bond strength of resin following NaOCl treatment before etching decreased when a MMA-TBB resin system was employed.³⁷ The decreased bond strength is improved when an ascorbic acid or a sodium thiosulfate solution is applied after NaOCl treatment; these solutions remove NaOCl by the oxidation-reduction reaction.¹⁸

Nikaido et al.¹⁶ evaluated the bonding strength at the buccal dentin surface after NaOCl treatment on root canal wall dentin ; the bonding strength of a total etching adhesive (single Bond) was significantly decreased after NaOCl treatment, while that of a self-etching primer system did not change. In the present study, the bonding strength of XenoIII (a self-etching adhesive) decreased following NaOCl treatment whereas that of Optibond Solo (a total etching adhesive) did not change. The results of this study were in contradiction to the results of Nakaido et.al. Therefore, the effect of NaOCl treatment on bonding strength may depend on the location of NaOCl application. XenoIII might not be effective for removing degenerated dentin and residual NaOCl, while the etchant of Optibond Solo might be strong enough to remove both. Moreover, the effects of NaOCl might be different between superficial dentin and root canal wall dentin. These may explain the discrepancy between the present findings and those previously reported.

There are many studies that evaluated the relationship between marginal adaptation and bond strength. Some studies have suggested no correlation between bond strength and marginal adaptation,³⁸ while others suggested that higher tensile bond strength meant lower dye microleakage.³² In the present study, the punch out bond strength did not always show a smaller value even when marginal gaps were observed. The scatter diagram showing the relationship between the punch out bond strength and gap free ratio of XenoIII is shown in Fig.10. The gap free ratio increased to 100% with the bond strength up to 6.5 MPa, it means no gap formation was recorded. On the other hand, the bonding strength of Optibond, more than 6.5MPa, showed 100% gap free ratio. These findings suggest that the marginal gap may not be produced when the bond strength is greater than a certain value; the bond strength of 6.5 MPa was considered to be the threshold for gap formation of the composite resin and the adhesive systems employed in this study.

However, the findings of this study were obtained after a relatively short water storage period without thermal stress. It is necessary to evaluate the changes of marginal adaptation and bond strength using a longer water storage period under thermal stress.

CONCLUSIONS

- 1 The experimental design for examining the marginal adaptation and punch out bond strength simultaneously was considered to be effective for evaluating resin bonding efficiency to root canal dentin.
- 2 The null hypothesis was rejected, that was the treatment of root canal with NaOCl would not compromise dentin bonding.
- 3 NaOCl interferes with the bonding ability of XenoIII but does not affect that of Optibond Solo.
- 4 The marginal gap may not be produced when the bond strength is greater than a certain value; the bond strength of 6.5 MPa was considered to be the threshold for gap formation of composite resin and root canal dentin.

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Structural Phylogenomics: Selection Pressure Suggests the Functionally Important Residues Encoded by Cisplatin Resistance Related 9 Gene

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ABSTRACT

Cisplatin Resistance Related 9 gene, CRR9, contributes towards the efficacy of the chemotherapeutic drug namely cisplatin. Genetic studies have established the association between CRR9 gene mutations and several cancers, but the structure-function aspects of the encoded protein remains largely unaddressed. In the present study, we have constructed a consensus phylogenetic tree of the CRR9 gene using maximum likelihood method after 1000 bootstrap replicates. Multiple sequence alignment of the selected orthologs was undertaken and important variations were analyzed with reference to the clade segregations and spatial locations in the constructed protein structure models. The topology of the phylogenetic tree appears in line with the established phylogenetic relationship of the mammalian lineage. The protein models of selected mammalian representatives suggest strong uniformity as Root Mean Square Deviation which varies from 0.03Å to 0.14Å. Both the DAS server and protein structure suggest the presence of two novel transmembrane regions ranging from Val461 to Ala483 and Thr490 to Tyr506. Multiple sequence alignment of the protein showed primate specific amino acid substitutions. Importantly, these variations are mostly situated in the core part of the protein structure implying their structural and/or functional significance. Conclusively, the present study of structural phylogenomics approach, not only illustrate the architecture of CRR9 protein but also delineate the critically important amino acids of possible structural and/or functional importance. Further studies in the direction of the site direction mutagenesis verify our finding and assist in functional understanding of the protein. Additionally, it also allows to contemplate new drugs for chemotherapy using potentials of CRR9 gene.

Key words: CRR9, cisplatin, structural phylogenomics, molecular evolution.

INTRODUCTION

Since its approval in 1978, cisplatin or cisdiaminodichloroplatinium II (CDDP) is considered as one of the most effective chemotherapeutic drug used in the treatment of variety of cancers for instance malignant tumors of testis, head and neck, oesophagus, lungs, ovaries and bladder.¹ Briefly, the mode of action of the drug suggest that cisplatin cross links with the DNA by interacting with its central platinum atom with the nitrogen base, preferably with the guanine bases, in the DNA.² The cross linked cisplatin mediated DNA adducts elicits cellular stress response particularly the DNA repair mechanism, which in turns lead to the apoptosis of the treated cell. Though details of cisplatin induced apoptosis has not been unraveled in greater detail, however, a mitochondrial serine protease namely

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Omi/Htra2 has been considered to be involved. Additionally, a high mobility proteins (HMG) has also known to play some role in the cytotoxicity of the drug.³ In addition to that, several other cellular proteins like PARP-1, DNA ligase III, XRCC1 and hMutS α are also found to interact with the cross linked anti-parallel strands established by cisplatin.⁴⁻⁵ Though cisplatin is still considered as an effective chemotherapeutic drug but its long term usage has been found hampered by the development of the drug resistance in the treated malignant cells. Some studies suggest that a paralog of ATP-binding cassette (ABC) transporters, multidrug resistance-associated protein (MRP), is involved in the development of resistance in the cancer cells by causing the ATP dependent efflux of the molecules to minimize the accumulation of the drug in the target cells.⁶ However, other studies have not substantiated these findings.⁷ Alternatively, in CDDP-resistant cells, the loss of molecules associated with DNA repair mechanism like MLH1 and MSH6 has been accounted responsible for the emergence of cisplatin resistance.⁷ Yamamoto et al., 2001⁸ reported upregulation of a novel gene namely cisplatin resistance regulated gene

(CRR9) in the CDDP resistant ovarian tumor cell line. In contrast to the name, the study found that the gene is involved in the CDDP induced apoptosis rather than the conferring resistance against it. The gene, CRR9, is also referred as cleft lip and palate transmembrane 1 like (CLPTM1L) and several genome wide studies have established association of its polymorphism with lung cancer⁹⁻¹¹ and testicular germ cell cancer.¹² Though genetic studies have conspicuously established the association of CRR9 with several cancers, the actual functions of the protein encoded by the gene remain elusive.

In the present study, we have constructed the phylogenetic tree and multiple sequence alignment of CRR9 gene using gene and protein sequences of the different orthologs of the selected mammals. We have also proposed a potential tertiary structure of the protein and investigated various structural aspects of the molecules which were not known earlier. Collectively, our finding not only proposed the structural conformation and evolutionary lineages of the CRR9 protein but also suggest the critical residues which may have structural and functional significance in the biological role of the molecule.

MATERIALS AND METHODS

Data mining: DNA and protein sequences of CRR9 gene were retrieved from NCBI [<http://www.ncbi.nlm.nih.gov>] and ENSEMBL [<http://www.ensembl.org>] databases using BLAST [blastn and blastp] with default parameters. The sequences were verified from the genomic information and as well in many cases from the published literature.

Multiple Sequence Alignment: Multiple sequence alignment of CRR9 proteins was carried out using CLUSTALX under default parameters.¹³ Wherever necessary (need to be more specific where adjustments were made in the alignment? Please see the mail), manual adjustments in the alignment were conducted. The alignment file was visualized by CLC sequence viewer and identity/similarity matrix plot was developed using GeneDoc.

Phylogenetic Analysis: Total 17 cDNA sequences including the out group of *Danio rerio* were used to construct the tree by maximum likelihood method based on Kimura-2 evolutionary model¹⁴ using MEGA5.01.¹⁵ Sequences with incomplete information or in some cases not present in both the mentioned databases (NCBI and ENSEMBL (already mentioned in the data mining section) were excluded from the analysis. The consensus tree was developed from 1000

bootstrap replicates¹⁶ to construct the evolutionary history of the taxa under study. The molecular clock hypothesis was rejected by invoking the Gamma distribution to account the difference in the evolutionary rates among different sites. Nearest Neighbor Interchange heuristic method was selected to generate original trees.

Protein Homology Modeling: Selected protein sequences were subjected to protein blast for homologous structures using NCBI database. Residues at conserved domain were verified using CDD and CD search Databases. Atomic coordinates of homologous structures were retrieved from RCSB protein databank.¹⁷ Models of human CRR9 and selected mammalian orthologs were constructed using appropriate template(s) from i-Tasser taken spatial restraints of templates into account.¹⁸ Briefly, i-Tasser constructs the atomic model of the query protein using multiple threading alignments and iterative structural assembly simulations. To further strengthen the acceptability of the model, another structure was constructed using the same templates (short stretches with 10-25 frame width) with Molecular Operating Environment (MOE). Both models were used to construct several plausible models using Modeller 9.10.¹⁹ The models were refined on the basis of thermodynamical parameters like free energy calculation and structural attributes for instance Ramachandran plots (di-hedral angle ratio) and clash score using Swiss Pdb viewer²⁰ and Molprobit.²¹

RESULTS AND DISCUSSION

Data mining has shown that CRR9 gene is widely distributed among the genomes of animals ranging from eutherian mammals to the even members of invertebrates, suggesting to their house keeping role in the organism physiology. The evolutionary tree based on nucleotide sequence of CRR9 gene was found well supported by the high bootstrap values especially among the major clades of primates, rodentia and artiodactyla. The phylogenetic tree corresponds to the established lineage of mammalian evolution both in terms of common ancestry and time scale divergence²² (Fig.1). Holistically, the out group (*Danio*) is well separated from the mammalian lineages. However, a little unorthodox position of the marsupial mammal (*Monodelphis*) may be due to the presence of the relatively less representative taxa or slow evolutionary rate in comparison to the rest of mammalian lineages.²³

The basal time of diversification in terms of rest of mammalian lineage appears to be around 150 MYA (million years ago), which are very close to the earlier studies notifying the basal diversification time of 166.2

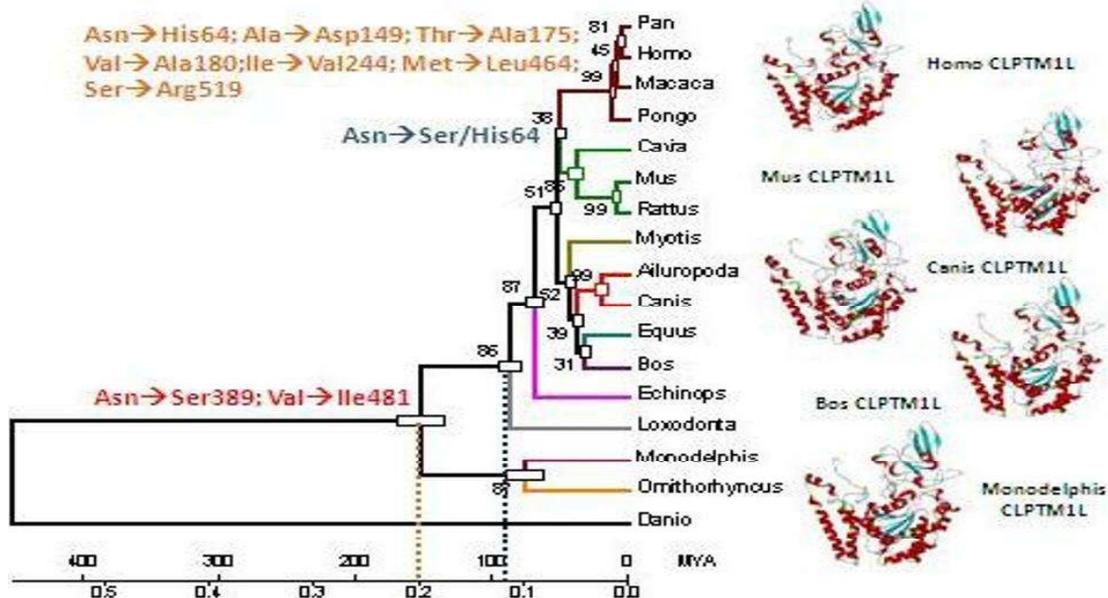


Fig.1

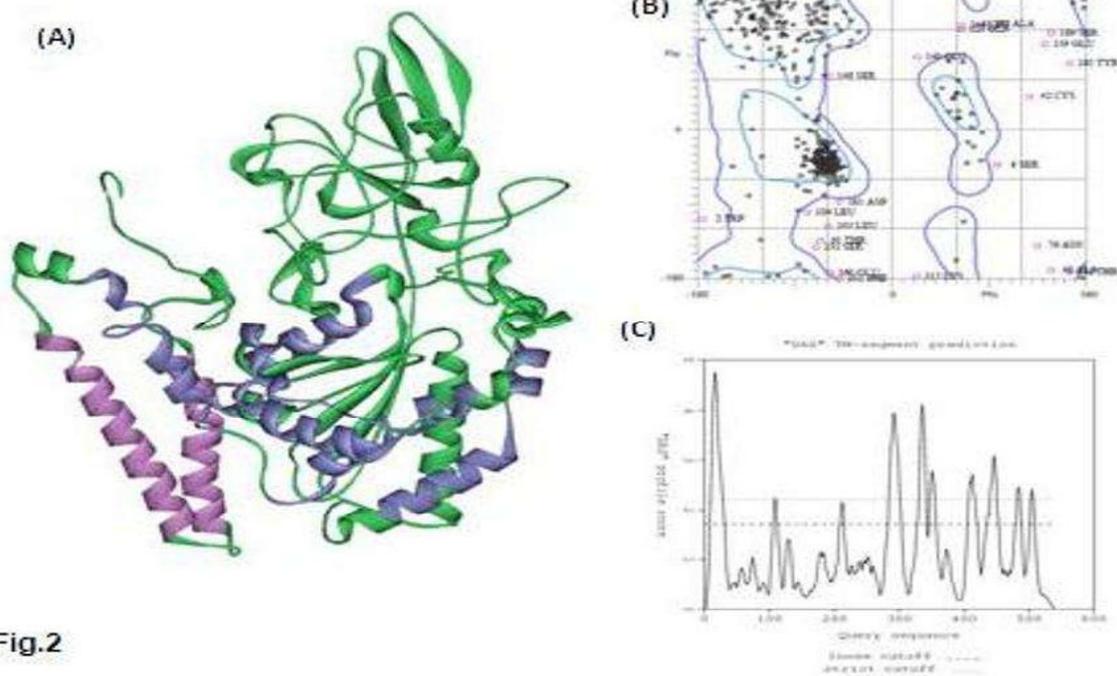


Fig.2

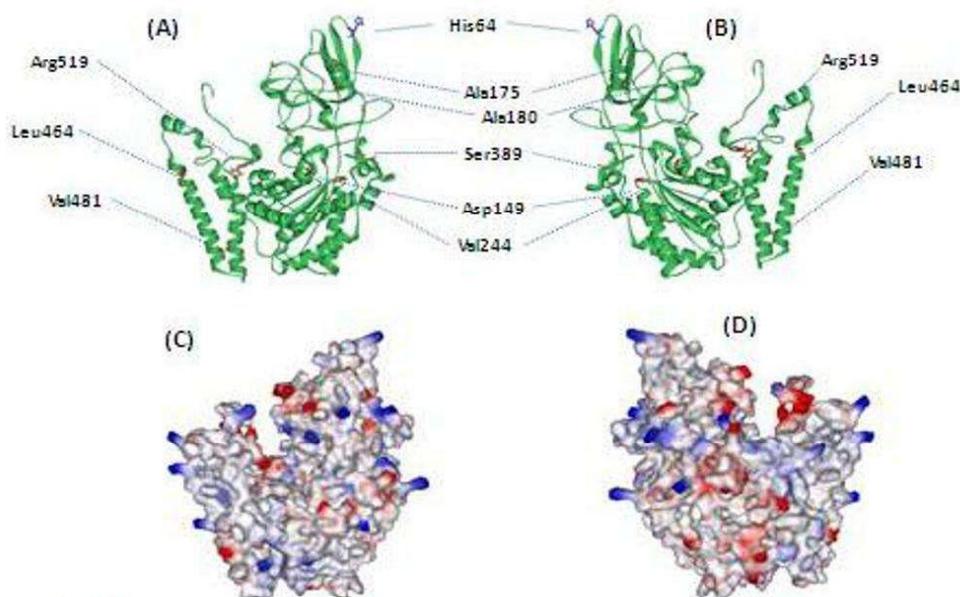


Fig.3

MYA.²⁴ Albeit, the placental mammals appears to be separated from the non placental mammals around 150 MYA but their diversification, so called crown group origin, appeared to be around 90 MYA, which suggests the presence of increased density of the extant mammalian lineage before the K/T boundary extinction (65 MYA), marked by the extinction of Dinosaur and most of the marine fauna. Interestingly, our results not only relegates the more conventional stand point related to the diversification of mammals based of the dates deduced by paleontological evidences²⁵⁻²⁶ but also demands the exploration and/or proposal for different rationale related to the origin of mammalian diversity. It is generally proposed that extinction of the dinosaur around 65 MYA leads to the removal of purifying selection which consequently favors the speciation of mammals. However, in light of our findings and many other molecular data, radiation of mammals at least to crown group extent many have occurred before 65MYA.²⁷⁻²⁸ Indeed, the pre K/T boundry extinction period (around 90 MYA) is notable in terms of many profound geo-climatic changes. Most notable among such events are rise of angiosperms (fruit bearing relatively short heighted plants), oceanic anoxia (93 MYA) and significant reduction in the earth temperature.²⁸ If excluded the chance of the coincidence, it is conceivable to hypothesize that the rise of angiosperms may compete the gymnosperms (seed bearing relatively tall plants), which may have adversely

affected the population of pre dominant group (dinosaurs) at that time allowing mammals to radiate under relatively lenient selection pressure. Moreover, Springer et al., (2003)²⁸ proposed the 43 lineages of placental mammals that have successfully passed through the K/T mass extinction.

When compared with the multiple sequence alignment (data not shown), several clade specific amino acid substitutions were noted among the compared orthologs. For instance all eutherian mammals have a substitution at position 389 and 481 where Asn was found replaced by Ser and Val was replaced by Ile, respectively. Similarly, in the rodentia specific lineage Asn64 is endemically replaced by Ser. A significantly high number of the substitutions have been noted in the primate clade where 7 substitutions were observed as Asn64His, Ala149Asp, Thr175Ala, Val180Ala, Ile244Val, Met464Leu and Ser519Arg. The clade specific substitutions indicate the presence of specific selection pressure that sculpted and subsequently locked the protein in the specific residual permutation. The presence of CRR9 homologs among invertebrates and specific changes as being seized in the primate lineage could collectively be inferred in terms of acquiring additional functions in addition to the basic one rendered by the mentioned substitutions. Combining the phylogenetic information with the amino acid sequence alignment has recently being used to explore the structurally and functionally critical residues in several proteins.²⁹⁻³¹

To further ascertain our predictions of critical residues in the CRR9 protein, we have constructed the protein model of CRR9 by multiple threading alignment and iterative structural assembly simulations. After removing the inter atomic clashes by manual rotation of the residual side chains, without altering the C α back bone, most of the residues in the secondary structure component of the proteins congregated in the allowed region in Ramachandran plot which signify the plausibility of the model. Collectively, for constructing the model using i-Tasser and MOE, 10 templates were used namely transferrin receptor (1de4),³² Drosophila apoptosome (1vt4),³³ Human α glucuronidase (1bhg),³⁴ Escherichia coli DNA polymerase II (1q8i), Karyopherin nuclear transport complex (1qbk),³⁵ regulatory domain of human PP2A (1b3u),³⁶ C protein of *Listeria monocytogenes* (1y9i),³⁷ angiogenic complex (1a4y)³⁸ and alginate lyase of *Agrobacterium* (3a0o).³⁹ Collectively the protein has two main domain, a C-terminal core domain which is mainly composed of α -helices and the N-terminal extended loop domain with intervening coils and β sheets. In CRR9 protein, six trans-membrane helices have already proposed ranging from Leu11-Val31, Tyr285-Phe305, Ala325-Asp342, Leu347-Val364, Tyr403-Ile423 and Tyr429-Leu449.⁴⁰

However, DAS transmembrane prediction server has predicted some additional transmembrane regions ranging from Val481-Ile486 and Phe503-Tyr506.⁴¹ In our protein model, we noticed that indeed such residues along with the amino acids present in their proximity could attain the helical conformations ranging from Val461-Ala483 and Thr490-Tyr506 and could consequently localized within the cell membrane. To the best of our information, the present study is the first in terms of proposing the two additional (novel) transmembrane helices in CRR9. Considering the number of helices and possible conformation of the protein it is likely that the protein may act as a channel for the drug molecules and may also have some additional role of structural nature in the membrane of the cells (Fig. 2).

To explore the effect of clade specific amino acid substitution on the holistic architecture of the CRR9 protein, homology models of representative of each clade (Human (*Homo sapiens*), Mouse (*Mus musculus*), Dog (*Canis lupus*), Cow (*Bos taurus*) and Opossum (*Monodelphis domestica*)) were built using the refined human CRR9 structure as a template. All CRR9 structures were superimposed over each other in order to delineate structural polymorphism among the models. Root Mean Square Deviation (RMSD) among the compared structures was found between 0.03Å in case of *Monodelphis* and *Bos* and 0.14Å in case of *Mus*

and *Homo*. Collectively, the difference as shown by the RMSD is not significantly high suggesting that the changes in the primary structure of the CRR9 are not translated into the tertiary structure. However, the RMSD values between human and opossum (0.11Å) suggest relatively fast rate of structural evolution of CRR9 from marsupials to primates as compared to monotrem and bovidae (Cattle family; Cow; *Bos*) and carnivores (Dog family; Dog; *Canis*) where RMSD is about 0.03Å (Fig.1,2). Additionally, the strong conservation of the secondary structure also implicates towards the housekeeping role of the CRR9 gene. Spatially, in human CRR9, out of the seven critical amino acids substitutions as found in the primate specific lineage four (Asp149, Val244, Leu464 and Arg519) are stationed in the core C-terminal part of the protein suggesting its main functional role however, three substitutions like His64, Ala175 and Ala180 which are present in the extended N-terminal region may be involved in some signal transduction or ligand binding due to their potential extracellular or intracellular localization respectively.

Briefly, in the present script, we have not only proposed the potential tertiary structure of the CRR9 protein but have also suggested the structurally and/or functionally important residues in the protein. Additionally, we have also mentioned about the novel structural elements (transmembrane regions) in the said protein. We expect that our findings will facilitate the site directed mutagenesis studies in order to establish the functions of CRR9 empirically and also aid in designing novel drug that can potentially use CRR9 molecular cascade for their efficacy in the treatment of respective gene associated anomalies.

Figure Legends:

Fig.1. Evolutionary tree based on CRR9 nucleotide sequence: Consensus phylogenetic tree was constructed using maximum likelihood method with bootstrap values mentioned at the nodal branches of the tree. Taxonomic distinct groups are differentially colored. Also presented are the proposed models of CRR9 protein of the representative of each clade. The evolutionary time scale is present at the bottom of the tree. Along with each clades lineage specific amino acid substitutions are also mentioned.

Fig.2. Structure of human CRR9 protein (A), Ramachandran plot (B) and DAS transmembrane server prediction (C). Potentially novel transmembrane helices are indicated with purple color while known transmembrane helices are colored blue. Extracellular/Intracellular extended N-terminal domain is represented by green color.

Fig.3. Distribution of potentially critical amino acids in human CRR9 protein (A & B). Electrostatic surface topology of the CRR9 protein. Positively and negatively charged regions with blue and red color respectively (C & D).

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Effectiveness of Cognitive-behavioral Therapy in Depressed Mothers of Cerebral Palsy Children

Nabila Soomro, Rukhsana Bibi and Mariam Bilal

ABSTRACT

Objective: The purpose of this study is to prove the effectiveness of cognitive behavioral therapy (CBT) in reducing the level of depression among mothers of cerebral palsy (CP) children.

Study Design: Intervention-based study.

Subject and Method: This study was conducted at department of Occupational Therapy, Institute Of Physical Medicine & Rehabilitation-Dow University of Health sciences. The present study was conducted during July 2011 to August 2011. Screened mothers with moderate depressive symptoms on Beck Depression Inventory-II were selected for CBT sessions. 24 mothers were enrolled for the therapy. Six structured CBT sessions for each mother were conducted. Pre- and post-interventional evaluations of depressive symptoms were done by using Beck Depression Inventory II (BDI-II).

Results: Means of pre-intervention and post intervention were compared to find out the effectiveness of CBT for depressed mothers of CP children. Results show a significant improvement in post interventional evaluation of depression symptoms, indicating that CBT helped these mothers to cope up with their depressive symptoms.

Conclusion: CBT assists mothers of CP children with moderate depressive symptoms to cope up with their depressive symptoms effectively.

Key words: Cognitive behavioral therapy (CBT), cerebral palsy, maternal depression, beck depression inventory-II, relaxation techniques, stress management.

INTRODUCTION

Most children spend healthy childhood and put little demands on society and care givers. About 7.7% have reported to experience complications during their growing period.¹ Cerebral palsy (CP) is the commonest problem that begins in early childhood.² It is defined as a group of disorders of development, movement and posture causing activity limitation that are attributed to non-progressive brain injury which occurs in the developing fetal or infant brain. The motor disorders of CP are often accompanied by disturbance of sensation, cognition, communication, swallowing, perception and behavior.³⁻⁴ It is the most common neurological disorder affecting children, with an estimated prevalence of 2.0 to 2.5/1000 life birth.² Raising a disabled child is a challenging process for the parents and care givers.⁵ The routine chores of feeding, toileting, traveling, and communication are

much more physically and emotionally challenging for parents of children with disabilities.⁶⁻⁷ It's not easy for parents to raise a child with special needs. These parents have to be stronger, adaptive and optimistic.⁸ Researches provide evidence that parents of children with special needs go through many psycho-social problems like anxiety, depression, feeling of helplessness, frustration and aggressive behaviors, whereas society's incompatibility supplements to the worries of family.⁹⁻¹⁰

As in children with disabilities, mother is an integral part of team working to improve child health. They face a lot of social and emotional problems.¹¹ Mothers suffer from psychological distress in response to their child's disability,¹²⁻¹³ so there is a need to emphasize on parent mental health issues, explicitly maternal depressive symptoms in this population. Researches indicate that mothers of disabled children are usually more prone to depression as compared to mothers of normal children.¹⁴ Singer (2006) stated that 6%-24% mothers of disabled children scored above clinical cutoffs for depression.¹⁵ Little work has been done to identify the prevalence and causes of maternal depression in neurological disorders such as cerebral palsy.¹⁴ Working with family especially mothers, help

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them to manage their depression thus indirectly helping CP child to improve his/her health.⁸

Coping includes psychological means to remove, adjust, or manage a disturbing event or emergency situation.¹⁶ It depends upon the parents' coping strategies how they interpret and manage their crucial situations in order to raise their child with special needs. Researches indicate that parents' financial status, educational level, problem solving skills, strong marital relationship and social support also help determine the parent's level of adjustment and coping with their problems.¹⁷⁻¹⁸ As depression is one of the main problems of mothers of children with disability so cognitive behavior therapy (CBT) could be used to help them manage their depression. "It is a form of action-oriented psychosocial therapy which assumes that maladaptive or faulty thinking patterns cause maladaptive behavior and "negative" emotions. The treatment focuses on changing an individual's thoughts (cognitive patterns) in order to change his or her behavior and emotional state".²¹ In a paper published in Lancet, Rahman et al (2001) reports the success of using CBT to treat maternal depression in rural areas of Pakistan.⁵ As far as author's knowledge is concerned, CBT is still not used for depressed mothers of disabled children to manage their depressive symptoms that could in return support them to improve their child's quality of life. Therefore, the focus of the present study was to find out the effectiveness of CBT with moderately depressed mothers of cerebral palsy children, so that child rehabilitation process could be facilitated and mothers can play more effective role in it.

METHODOLOGY

It was an intervention-based study, conducted at Institute of Physical & Rehabilitation- Dow University Health Sciences. The study period was from July 2011 to August 2011. Subjects were selected on convenient basis, after obtaining written informed consent. They were explained the purpose of study and how it would help them in rehabilitation process of their child. Only moderately depressed mothers were enrolled for six structured CBT and were post-evaluated for depression using Beck depression Inventory. Mothers with any other mental illness or those who were unable to comprehend and follow instructions were not included in the study.

Mothers were called to Institute of Physical Medicine & Rehabilitation on alternative days for 45minute session. Focus of the sessions was to help them to change their faulty cognition(negative thoughts), teach them relaxation and stress management techniques.

Furthermore they were provided with an opportunity to discuss their problems and to develop a positive view of life.

Results were evaluated using SPSS 16. Mean value of depressive symptoms on BDI-II before and after CBT sessions were taken to see the difference; p-value of < 0.05 was considered statistically significant with confidence interval of 95%. (See Tables 1 & 2).

RESULTS

Mean value of pre-intervention (before CBT) is high i.e. 25.5 when compared with post-intervention (after CBT) Mean value i.e. 21.4 (See Table: 01) indicating that CBT helped mothers of CP children to cope up with their depressive symptoms.

Furthermore results show significant change on⁹ out of 22 items of BDI-II (See Table: 02. Before CBT Mean value for guilt feeling was 1.4, while after CBT Mean value was 0.4, signifying that CBT helped these mothers to change their guilt-related feeling by re-educating them the actual cause of their child disability. Similarly for their self-critical thoughts pre-intervention (before CBT) Mean value was 1.6 and after intervention (after CBT) Mean value was 0.7, also an indicator of improvement in self-critical feelings that were substituted by more appropriate and positive thoughts during therapy sessions.

Suicidal thoughts Mean value before intervention was 1.6 and after intervention mean value was 0.3, show that their suicidal ideations decreased after taking therapy by using thought stopping techniques and diverting mind to more positive thoughts.

Whereas Mean values for crying spells were 1.7 (before intervention) and 0.6 (after intervention), show their crying spells reduced as they learned to stop their negative thoughts that were reason to cry by substituting them with more positive and healthy thoughts. 1.7 was the Mean value for feeling of punishment before intervention and 0.8 was the mean value of after intervention; show that CBT helped them to reduce these feeling.

The Mean value before CBT sessions for loss of interest in activities was 1.5 and after CBT sessions it significantly changed to 0.4, which means after receiving CBT these mothers developed interest in their daily activities.

Mean value for change in sleep pattern before CBT sessions was 1.7 and after CBT sessions was 0.7: shows a significant improvement, indicating that CBT helped these mothers to have a sound sleep.

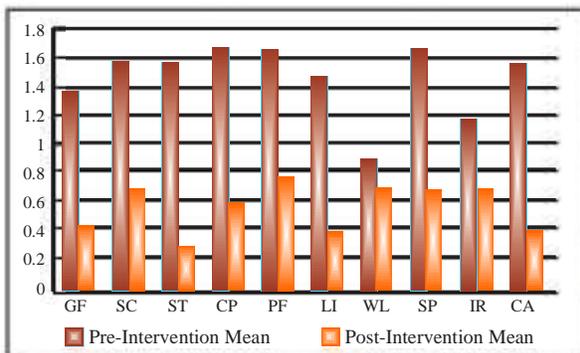
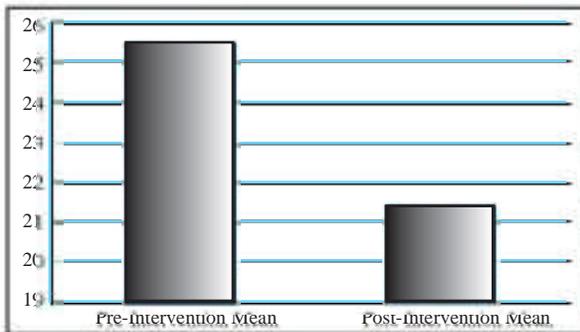
Level of irritability decreased after receiving CBT as Mean values changed from 1.2 (Mean of before intervention) to 0.7 (Mean of after intervention). CBT also helped these mothers to have a track of their daily diet and to add a healthy food into their diet that improved their appetite. Before intervention Mean value for change in appetite was 1.6 and after intervention Mean value was 0.4, indicating a significant improvement.

Table 1: Mean Value of BDI-II before CBT and after CBT

Sample Size N	Pre-Intervention Mean	Post-Intervention Mean
24	25.5	21.4

Table 2: Mean Value of Sub-Domain of BDI-II before CBT and after CBT

S.No	Sub-Domain	Pre-Intervention Mean	Post-Intervention Mean
1	Guilt feeling (GF)	1.4	0.42
2	Self-criticalness (SC)	1.6	0.7
3	Suicidal thoughts (ST)	1.6	0.3
4	Crying spells (CP)	1.7	0.6
5	Punishment feeling (PF)	1.7	0.8
6	Loss of interest (LI)	1.5	0.4
7	Changes in sleeping patterns (SP)	1.7	0.7
8	Irritability (IR)	1.2	0.7
9	Changes in appetite (CA)	1.6	0.4



DISCUSSION

This study reveals the impact of cognitive behavioral therapy (CBT) on depressed mothers of cerebral palsy (CP) children. It signifies a modified treatment in which evidence-based intervention was used to help mothers of CP children to cope up with their depressive symptoms. Results indicate that mothers receiving CBT experienced substantial reductions in depressive symptoms as pre-treatment mean scores of BDI-II were high (i.e., 25.5), and treated mothers scores low (mean 21.4) specifically on items related to guilt feelings. As previously they felt that they were personally responsible for their child's disability. Subsequently suicidal ideations in these mothers have shown a decline and they showed a more appropriate coping strategy against their child problem.

Researchers indicate that maternal depression has negative impact on children's health, thus improvement in depressive symptoms of mothers has a potential to benefit their child.⁸ So the CBT could help these mothers to improve their motherhood abilities.⁵ There are two possible mechanisms by which CBT affects maternal attitude towards motherhood for CP children. Firstly, by helping these mothers to alter their faulty cognitions like feelings of worthlessness, guilt and self-critical analysis. Secondly, by improving mother-child relationship thus by focusing to reduce mother's irritation, increasing her interest in life and in child's rehabilitation, this is also achieved by teaching them relaxation techniques which ultimately help mothers to cope with stress and improving their sleep.¹⁹

After receiving CBT mothers reported increased satisfaction and interest in their life, they reported decrease in self-critical analysis that was the major factor leading to frequent crying spells and suicidal thoughts, the results also correlate with an open trial of In-home CBT conducted by A.T. Robert et al (2003), who reported that mothers receiving CBT showed increased satisfaction towards motherhood and more positive view of child and child-rearing from pre to post treatment.²⁰

Moreover mothers receiving CBT during their sessions learned how to relax themselves by using relaxation techniques and altering cognitions, thus they reported decrease in irritability and improved feelings of wellbeing after involving themselves in pleasurable activities.

This study was an initial step to re-educate mothers of CP children and helping them to cope up with their depressive symptoms, it seems additional efforts are needed to engage and maintain this population in treatment. This study had limitations as it was conducted

with mothers of CP children only; it must also be conducted with mothers of children having other type of physical/mental disabilities and with mothers of children with no disability so that data could be compared which would help to identify the normal level of stress/depression among all mothers. The researcher would be able to differentiate between the levels of stress/depression among mothers of children with/without disability.

The study also has strength that for the first time in Pakistan the mental health issues of mothers of children with disability are addressed and now work has been done on their psychological well being facilitating the rehabilitation process of their child.

There are various possibilities for forthcoming research with mothers of disabled children using CBT. Replication and expansion is needed to recheck the favorable results of this study. Furthermore follow-ups should be made to see the period of effectiveness and relapse prevention and long-term impact on children rehabilitation processes.

CONCLUSION

Cognitive Behavioral Therapy (CBT) is an existing evidence-based treatment for depressive symptoms; this study proved that CBT assists mothers of disabled children to cope up with their depressive symptoms that help them to participate effectively in their child rehabilitation management

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Comparison of Frequency of Depression Among Patients and Their Healthy Attendants at Medical Out-Patient Department of Civil Hospital Karachi

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ABSTRACT

Objective: To determine frequency of depression in patients and their healthy attendants at medical OPD of Civil Hospital Karachi.

Patients & Methods: Patients attending medical OPD were administered DSM-IV questionnaire comparative observational. Equal number of healthy attendants with the patients were selected as control. Diagnosis of depression was made if DSM-IV score of = 5 was present. Frequencies of depression were compared with control. Two groups were analyzed basis of gender, marital status, education and occupation.

Results: During the study, 236 patients and equal number of controls were included. The mean DSM-IV score was significantly higher in patient group (3.8/Standard Deviation?) as compared with control group (1.6/ Standard Deviation?). The number of depressed subjects in control group was 19 (8.1%) and that in patient group was 99 (41.9%), the difference was statistically significant (χ^2 test; p value <0.001). No difference in frequency of depression was found on basis of marital status but significant differences were found on the basis of gender, education and occupation.

Conclusion: Significant numbers of patients attending the medical OPD were depressed.

Key words: Depression, DSM-IV, Outpatients.

INTRODUCTION

Depression affects about 20% of normal adult population annually. Out of these about 40% seek general medical advice from Internal medicine while a very small number of patients seek specific psychiatric advice.¹⁻² This leads to delay in start of treatment which causes increased severity of depression.³ Problem is compounded due to somatization in majority of these patients who start seeking medical advice for these symptoms instead of depression.⁴ The ability of general physicians to recognize depression is limited.⁵

Depression is more likely to occur with certain medical illnesses. The include heart disease, stroke, diabetes, cancer, hormonal disorders (especially peri-menopause or hypothyroidism), Parkinson's disease and Alzheimer's disease.⁶⁻⁹

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Reporting of depression is very low in our society due to myths attached to the psychiatric disease and patients and their families are reluctant to accept it and thus, it remains a neglected area.¹⁰ There is a simple criterion given in Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV) for diagnosis of depression in outpatient clinics.

Diagnosis of depression is important as treatment for depression in conjunction with the treatment of the co morbid illness gives good prognosis than the treatment alone for their disease.¹¹ Depression is also a risk factor for noncompliance with medical treatment.¹²⁻¹³ This study was designed to document the frequency of depression using DSM-IV in patients attending general medical clinic and to compare it with healthy controls. This study will help in documenting the magnitude of this problem and will help in making proper strategies in management of depression.

PATIENTS & METHODS

All patients of either gender attending medical OPD of Civil Hospital Karachi from June 2010 to September 2010 were enrolled for the study after taking informed consent. For each patient enrolled, a normal attendant

of patient was taken as control. Patients attending psychiatry OPD, taking anti-depressant drugs were excluded. Ethical approval for the study was obtained from Dow University of Health Sciences (DUHS). Demographic information regarding age, gender and address were recorded in the study proforma in OPD. DSM-IV questions were read out by investigating medical student to the subjects who were unable to read and responses recorded. Each question was given a score of one and patients with score of = 5 were labeled depressed. Mean age \pm SD of selected patients was calculated and compared among genders by Student's t test. P value of = 0.05 was taken as significant. Depression was compared between the two groups using χ^2 test.

Statistical analysis was performed using Predictive Analytics Software (PASW) version 18.0. Demographic variables of gender, marital status, education and occupation were compared between control and patient group using χ^2 test.

RESULT

A total of 236 patients and equal number of healthy controls were enrolled in the study according to the selection criteria. There were 35.6% (n=84) males and 64.4% (n=152) females in patient group while there were 40.3% (n=95) males and 59.7% (n=141) females in control group. The percentage of married people in control group was lower as compared to patient group [34.7% (n= 82) vs 72.5% (n=171)] Demographic details are given in Table I.

The mean of DSM-IV score was significantly higher in patient group (3.8 \pm 2.4) as compared with control group (1.6 \pm 1.8). Application of Student's t-test gave highly significant p-value of <0.001. The DSM-IV scores in both groups were recoded into new variable using criteria of > 5.0 all those satisfying this criterion were labeled as depressed. Frequency of depressed subjects in control group was 19 (8.1%) and that in patient group was 99 (41.9%), the difference was statistically significant (χ^2 test; p value <0.001).

The patient group was further studied for frequency of depression according to various variables like gender, marital status, education and occupation. Frequency of depression inpatient group according to gender was males 20/99 (20.2%) and females were 79/99 (79.8%). Depression was significantly more frequent among females in patient group with p value <0.001. In the in patient group, 171 subjects were married. Frequency of depression in married patients 75/171(43.9%) was not significantly different from that in unmarried

patients 96/171 (56.1% , (χ^2 test; p = 0.377). Frequency of depression was seen highest in illiterate patients and lowest in graduates (details are given in Table II). Difference in frequency of depression according to occupation was also statistically significant (χ^2 test; p value = 0.001) with none of the students was depressed while its frequency in employed was 25.3% (n=25), in unemployed was 31.3% (n=31) and was highest in house wives at 43.4% (n=43).

Table I: Demographic Detail of Subjects

		Groups	
		Control n (%)	Patient n (%)
Age (years)		27.7 \pm 10.7	38.1 \pm 13.3
Gender	Male	95 (40.3)	84 (35.6)
	Female	141 (59.7)	152 (64.4)
Marital status	Married	82 (34.7)	171 (72.5)
	Unmarried	154 (65.3)	65 (27.5)
Education	Illiterate	26 (11.0)	110 (46.6)
	Primary	14 (5.9)	71 (30.1)
	Matric	27 (11.4)	32 (13.6)
	Undergraduate	97 (41.1)	12 (5.1)
	Graduate	72 (30.5)	11 (4.7)
Occupation	Student	101 (42.8)	14 (5.9)
	Housewife	33 (14.0)	81 (34.3)
	Employed	90 (38.1)	71 (30.1)
	Unemployed	12 (5.1)	70 (29.7)

Table II: Depression according to Education status (n=236, the patient group only?) If yes, where is the comparison?

Educational Status	Control n=236	Patient n=236
Illiterate	3	59
Primary	0	31
Matric	1	7
Undergraduate	8	2
Graduate	7	0

Pearson Chi-Square Tests

		Group	
		Control	Patient
		Depression	Depression
Education Status	Chi-square	2.619	22.650
	df	4	4
	Sig.	.623 ^a	.000 [*]

Results are based on nonempty rows and columns in each innermost sub table.

a More than 20% of cells in this sub table have expected cell counts less than 5. Chi-square results may be invalid.

* The Chi-square statistic is significant at the 0.05 level.

DISCUSSION

Our study showed that a significant number of patients attending the medical OPD were depressed. This is an important finding as the patients were not aware of it neither they were seeking a therapy for depression, and were not taking any therapy for depression.¹⁴

Depression is one of the common associations with chronic illness. It is estimated that up to one-third of individuals with a serious medical condition experience symptoms of depression.¹⁵ Presence of depression also results in negative impact on quality of life of sufferer.¹⁶ This effect have been shown in patients in many diseases like chronic heart failure, dyspepsia, liver diseases and malignancy.¹⁷⁻¹⁹

Recognition and appropriate diagnosis of depression in primary care is associated with significantly greater short-term improvement, thus increasing recognition of depression in primary care is desirable.¹⁴

Although we did not study the predisposing factors responsible for depression in our patients, in another study major predictors of depression in out-patients were identified as baseline physical disability, marital status, early treatment adequacy and early remission on the course of major depression.²⁰ In our study marked gender difference was observed with about 80% of the females were depressed. Similar female preponderance was also observed in epidemiological survey of 23 European countries where depression was found to be more prevalent in females.²¹⁻²² In our study frequency of depression was also found to be relatively higher in illiterate and unemployed, this effect was also reported in another study which showed similar trend in prevalence of depression.²³ Full-time employment and holding a technical and professional job is shown to be with reduced risk of depression.²³ On the other hand increased verbal aggression, urinary incontinence, increased pain, weight loss, change in care needs, cognitive decline and decline in activities of daily living significantly increased the likelihood of new depression.²⁴

CONCLUSION

Depression was found in significant number of patients attending medical outpatient department which has significant effect on quality of life and compliance to treatment. There is a need to increase awareness both in treating physicians and patients to address this important issue.

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Oral Health Knowledge, Attitude and Practices of a Public School Children of Karachi, Pakistan

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INTRODUCTION

A positive decline in prevalence and severity of dental diseases has been observed over the past fifty years in children who are residents of industrialized countries.¹ This may be due to appropriate health education programs that are conducted with the aim to decrease destructive oral health habits, so that impact of negative chronic oral disease becomes diminished.² These dental health behavior programs conducted among children and young are scientifically planned³ to ensure positive long term dental health and hygiene, hence developing positive influence on child's knowledge, attitude and practice towards sustaining good oral health.⁴

Most of the studies have reported improved oral hygiene practices during childhood as a result of major changes in oral hygiene behavior. These studies have mostly been conducted amongst industrialized or developed populations such as United Kingdom, Canada and USA where most of the children practise brushing twice daily on regular basis.⁵ Another similar study conducted among schoolchildren in North Jordan, reported that although children were aware of importance of oral health but there was lack of dental health knowledge in parents that ultimately affected their child's dental visit, so emphasis on parental education in addition to child education also plays major role.⁶

However, it has been reviewed that this change in knowledge, attitude and behavior has not been observed among children belonging to developing countries. A study conducted on schoolchildren in Jeddah city reported that knowledge, attitude and practice related to periodontal health among school children needs improvement.⁷ Another study related to health behaviors in Chinese schoolchildren raised the need of appropriate oral health education programs in order to improve knowledge, attitudes and practices of these children concerning their oral health.⁸

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The present study was conducted to evaluate oral health knowledge, attitude and practice related to oral health in public schoolchildren of Karachi city so as to highlight the need of oral health programs in the respective area.

METHODOLOGY

A previously validated questionnaire that was used in the study conducted in Jordan,⁶ was administered amongst a total of 459 school children studying from class one to class six (age 6-15 years) of a single public school setting in Karachi, Pakistan. The items used in each domain consisted of questions on oral health knowledge, attitude of schoolchildren towards dental services, and mouth and dentition cleaning practices. Prior to starting the research a verbal consent was taken from the school administration as well as individually from subjects. Questionnaire was in simple English language but as their study was being conducted among public schoolchildren, so it was filled by the group that was conducting this research, based on the answers provided by the schoolchildren. Later on the questionnaires were assembled and data were entered in Statistical Package of Social Services version 16 and descriptive analysis was done in which frequencies and percentages were found.

RESULT

It was found that from a total of 459 schoolchildren 58% were males and 42% were females, where the mean age of males and females were (9.3±2.0) & (8.77±1.72) respectively.

Table 1 shows knowledge, practices and attitude based responses respectively of the subjects regarding their oral health. More than 60% of the total subjects were observed to have better knowledge regarding oral health. While oral hygiene practice seems to be satisfactory as almost 41% of subjects reported that they brushed twice daily. However, 73% reported that they brushed in morning only furthermore one of the affirmative finding was that subjects were in habit of using toothpaste for cleaning their teeth rather using other mouth cleaning aids. Moreover, over all attitudes of the subjects were not positive towards taking dental services as majority were found to be scared and only visited a dentist whenever they felt pain.

	Questions	Yes (%)
KNOWLEDGE	Does caries affect teeth appearance?	353 (83.8)
	Do fizzy drinks affect teeth adversely?	289 (68.2)
	Do sweets affect teeth adversely?	385 (85.44)
	Is there any relation between general body and oral health?	349 (70.03)
	Do you care about your teeth?	402 (87.58)
	Is brushing teeth preventing dental decay?	412 (88.7)
ATTITUDE	First dental visit:	
	Scared	261 (56.86)
	Slightly scared	59 (12.85)
	Very slightly scared	46 (10.02)
	Never afraid	93 (20.26)
	Frequency of dental visit:	
	Every 6 to 12 month	45 (9.8)
	When have dental pain	241 (52.5)
	Occasionally	55 (11.98)
	Never visited a dentist	118 (25.7)
	Is regular visit necessary to dentist?	356 (77.55)
	Dental treatment on last visit:	
	Consultation	334 (72.7)
	Take x rays	11 (2.39)
	Scaling	17 (3.7)
	Fillings	31 (6.75)
	Crown and bridge	2 (0.43)
Orthodontic	2 (0.43)	
Extractions	43 (9.36)	
Fluoride on teeth	7 (1.52)	
Treat my gums	12 (2.61)	
Does dentist solve your problem?	366 (84.69)	
Does dentist cure patients?	402 (87.58)	
PRACTICE	Brushing frequency:	
	Not regularly	45 (9.8)
	Once per day	173 (37.7)
	Twice per day	189 (41.2)
	More than twice per day	52 (11.3)
	Aids for cleaning teeth:	
	Tooth brush plus paste	443 (96.5)
	Dental floss	5 (1.1)
	Mouth wash	1 (0.2)
	Miswak	10 (2.1)
	Tooth brushing timing:	
	Morning	335 (73)
	Noon after lunch	8 (1.7)
	Before going to bed	22 (4.8)
	Others	94 (20.5)
Duration of brushing:		
Less than 1 min	70 (15.3)	
1 min	99 (31.6)	
2 min	128 (27.9)	
More than 2 min	162 (35.3)	
Supervision for brushing:		
Parents watch me	105 (22.8)	
Parent do not watch me	105 (22.8)	
Only mothers watch me	114 (24.8)	
Never cared	135 (29.4)	

DISCUSSION

This study represents an outline of the oral health knowledge, attitudes and practices of children ages 6-15 years belonging to public sector school. This study is helpful in exploring problems and needs of public sector schoolchildren as well as their perception about oral health. According to this study, knowledge of subjects seems to be positive about dental health. In addition, they knew that decay affects the appearance of teeth and also use of carbonated drinks and sweets affect teeth badly. Subjects' responses also showed their awareness, that regular tooth brushing is good for preventing tooth decay as well as oral health has direct influence on general health. Similar results were found in another study that was conducted by Ernesto Smyth et al among 12 year old school children in Spain.⁹

The attitude of study sample related to their first dental visit seems to be hesitant because majority of subjects responded that they were frightened from dental services. Moreover, attitude of study group towards frequency of visiting dentist was observed to be alarming because most of the subjects replied that their last visit to dentist was because of pain that was the main reason, which is proved by other studies⁷ as well. Although most of the study subjects have the opinion that visiting dentist is necessary, but due to high treatment cost most of the subjects do not bear regular visiting or any sort of dental treatment.

Hence, it has been found that apprehension from dental services seemed to be high among the study group which might be attributed to the lack of proper oral health education programs for both children and their parents, which in addition to the above-mentioned reasons rendered dental treatment undesired. One of the main reasons in our set up may be that dentists are unable to treat children in a friendly way, secondly there might be lack of community-oriented dental practices as well scarcity of health education and promotion strategies in our country. Hence, by implementation of community oriented dental practices together with dental education we can change thoughts of population related to dental services.

Studies related to knowledge, attitude and practices conducted in India also reported need of community oriented dental education programs in order to increase the level of knowledge and to change attitudes and practices in relation to oral health among children.¹⁰

Similarly a recent study conducted in Lahore, Pakistan highlighting the same problem regarding oral health knowledge, attitude and behaviors reported that schoolchildren were found deficient in knowledge related to oral health preservation as well as its functions.¹¹

Regarding oral health practices, it was observed that most of the schoolchildren have pragmatic approach towards brushing their teeth twice daily with the help of a toothbrush and tooth paste as a cleaning aid for teeth. This result is consistent with other studies conducted in Sweden, Denmark, Germany, Austria, and Norway, which reported that about 73-83% of school children used to brush their teeth twice a day.¹² While there is almost negligible use of other cleaning aids such as miswak, dental floss and mouthwash among these school children. Similar study conducted in Jeddah reported that although school children were using toothbrush and paste as a cleaning tool but they were also lacking practices related to dental floss and mouth washes.⁷

It was found that most of the study subjects were positively pursuing dental practices except for the response that children are not being supervised by their parents during tooth brushing, this shows that although children brush teeth regularly but whether way of brushing is correct or not this is not being observed. Similar study conducted in Jordan reported same findings that parent's of Jordanian children failed to support their child's tooth brushing practices suggesting lack of adequate knowledge and awareness about gum problems.¹³⁻¹⁴

CONCLUSION

It is suggested that children should be encouraged for their good oral health practices by their school teachers or their caretakers. Also emphasis should be given on oral health education and promotion so that approach pertaining to availing of dental services becomes optimistic. Hence, there is a need for community-based oral health education as well as supervised oral health practices programs that should be designed and conducted to improve oral health knowledge and routine dental practices. It is suggested that such programs can be organized by the government in coordination with dental professionals and implemented through mass media. Furthermore, outreach health education teams can also play an important role in the delivery of oral health messages to those who are less well-educated and have fewer socio-economic advantages, especially in public schools as well as underprivileged areas

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Knowledge, Attitude and Practice of Mothers Regarding Management of Diarrhea in Children of Early Age

Rubeena Gul and Raheela Amin

INTRODUCTION

In Pakistan 4.446 million children are born every year, out of which 8.99% die before reaching the age of 5 years.¹ The pediatric death toll due to diarrheal illnesses exceeds that of AIDS, tuberculosis and malaria combined. In poor countries, diarrheal disease is second only to pneumonia in causing deaths of children under five years of age. Every week, 31,000 children in low-income countries die of diarrheal diseases.² The most common causes of death amongst children under 5 years of age, not considering new borns are diarrhea and pneumonia.³ In Pakistan, diarrhea is rated as the number one killer of children, accounting for about 25,000 deaths annually.⁴ Every day, about 1,100 Pakistani children under the age of 5 years die of diarrhea and diseases related to water, sanitation and hygiene.⁵ In addition, diarrheal diseases are costing Pakistan Rs.55 billion annually as 91 million population lack access to proper sanitation in the country.⁶

Khyber Pakhtunkhwa has an area of 74521km² and Peshawar is its capital city. Total population of Peshawar is 20.05 million. Population of children under five year of age makes 16% of the population i.e. 3.208 million. In 2007 data collected from all available health facilities show that 3,879 cases of severe diarrhea were reported in children of 5 years of age. In 2008, 6901 cases reported and in year 2009 till June, 1,750 cases were reported.⁷

Community health education is of utmost importance for effective case management, since it has the potential to establish productive contact between health services and the community to increase the capability of families to recognize danger signs of diarrhea in children to encourage early care seeking behaviors. Effective health education can be provided on the basis of accurate understanding of prevailing knowledge, attitude and practice of community. Therefore, it is necessary to have relevant information concerning KAP of mothers

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about diarrhea for successful implementation of control activities. Therefore, the objective of this study is to determine the knowledge, attitude and practices of mothers regarding the management of diarrheal diseases in children of five years of age.

METHODOLOGY

A cross-sectional descriptive study was carried out in both rural and urban areas of Peshawar, over 12 weeks period from June to August 2010. The selected study areas were the diverse areas (both urban and rural) of Peshawar city. Using convince sampling technique a sample of 600 households, 300 each from urban and rural locations were selected. Data were collected by administrating a structured questionnaire to the mothers comprising the sample. The Inclusion criterion was mothers with at least one child of under five years of age. The respondents were the mothers of under five year old child.

Pilot study was conducted to check the validity of the study interview instrument. Data were collected using structured questionnaire with both open and close ended questions. The instrument was implemented by conducting face-to-face interviews with the mothers of the under five-year-old child. Before implementation of interview, verbal consent was taken from the mothers.

RESULTS

Of 600 mothers from rural and urban areas, 44% and 75.3% mothers respectively were educated. Of 44% rural mothers 14.6% had primary, 13.3% had middle, 6% had secondary level education. Of 75.3% urban mothers 8% had primary, 13.3% had middle, 50.6% had secondary level education.

75% and 86.7% of the sampled rural and urban mothers respectively had knowledge about diarrhea. While 20% rural and 39.33% urban mothers had a good knowledge of the effects of diarrhea - body weakness, weight loss and fluid loss i.e., they knew that loose watery stool is dangerous and can cause dehydration. 28.6% rural and 29.33% urban mothers had satisfactory knowledge i.e. body weakness and fluid loss. 26.6% rural and 18% urban mothers had basic knowledge i.e. body weakness.

146 (48.7%) rural and 242 (80.7%) urban mothers had knowledge about how to prepare S.S.S. i.e., a fistful of sugar, a pinch of salt and a jug of water a simple solution for a life threatening condition.

270(90%) and 276(92%) mothers had knowledge about ORS solution respectively i.e., they knew that one packet of ORS is added to one liter or four glasses of water.

Regarding home-based treatment as shown in fig:1, 44.6% rural and 71.3% urban mothers had positive attitude, i.e. giving S.S.S and ORS solution. While 38.6% rural and 20% urban mothers gave green tea and raw sugar solution. 16.6% rural and 8.66% urban mothers gave plain water and juice to their child.

156 (52%) rural mothers treated their child at home, 142(47.3%) took their child to hospital and 2(0.7%) to a non-certified medical practitioner. Similarly, 98 (32.7%) urban mothers treated their child at home with home-based fluids, 198(66%) took their child to hospital and 4(1.3%) took their child to a non-certified medical practitioner.

Regarding breast-feeding practices 220(73.3%) and 250(83.3%) mothers continued breast feeding the child during a diarrheal episode.

Among 600 mothers from rural and urban areas, 134(44.7%) and 94(31.3%) stopped weaning diet during an episode of diarrhea respectively.

All the mothers gave fluids when their child had an episode of diarrhea of which 140(46.7%) and 168(56%) mothers respectively gave fluids in no dehydration following plan A, where fluid deficit is less than 5% of the total body weight and the child is thirsty, when the child keeps asking for water, is an early useful symptom of dehydration where early oral fluid therapy is done as shown in Fig:2. 18% rural and 31.33% urban mothers increased fluid intake in some dehydration following plan B, where fluid deficit is 5-10% of total body weight, thirst, sunken eyes and depressed fontenella. While 35.33% & 12.6% gave fluids in severe dehydration following plan C where fluid deficit is more than 10% of the total body weight beside the above signs the child has cold extremities.

Among 600 mothers from rural and urban areas, 240(80%) and 268(89.3%) mothers respectively practise the ORS solution preparation. But 222(74%) rural mothers and 290(96.7%) urban mothers could properly demonstrate how to prepare ORS solution preparation.

Regardless of type of dehydration majority of the children were taken to the hospital. 270(90%) of rural and 280(93.3%) of urban mothers followed the instructions given by the doctor i.e. to give fluids after each loose motion and continue breast feeding during an episode of diarrhea.

Figure 1: Comparison of Attitude of Mothers Regarding Home Based Treatment of Diarrhealoses in Urban and Rural Areas

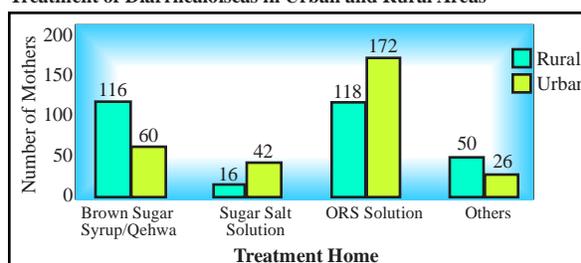
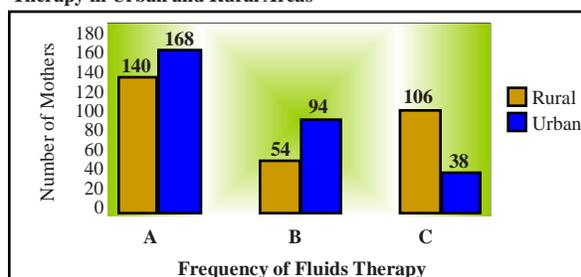


Figure 2: Comparison of practices of Mothers Regarding Fluids Therapy in Urban and Rural Areas



DISCUSSION

Primary health care is very important for the development of a country. Educated mothers can play important role in the control of diarrheal diseases. If mothers are educated, they will know how to treat their child properly and will practise oral rehydration therapy properly and will follow the instructions given by the doctor. Our survey reveals that literacy rate of mothers is lower in rural than urban areas which correlates with economic survey of 2009-10,⁸ as literacy is prevalent in females but progress is uneven across the province.

86.7% mothers from urban area while 75% mothers from rural areas have knowledge about increasing fluid intake in diarrhea. The main source of information in urban areas is mass media while in rural areas it is the basic health unit. In order to increase the awareness further, it is important to improve health services, encourage the health staff in their efforts and to improve the source of communication by training the health staff in interpersonal communication and also educate the gate keepers i.e. religious scholars, teachers etc by using health education tools which are locally acceptable.

81% and 49% mothers from urban and rural areas respectively are aware of increasing intake of fluids during an episode of diarrhea. These fluids are locally acceptable as revealed by our study. Therefore, mothers in rural areas must be educated so that they can properly treat their child at home. In our study, it is evident that most of the mothers from urban and rural areas (92% and 90%) have knowledge about ORS solution which

indicates improvement in health education in both urban and rural areas; this figure is contradictory to WHO 1992-1993,⁹ our figures report 6% of the mothers correctly practise home case management for their children with diarrhoea.

The attitude of mothers for the control of diarrhea is of prime importance. Home-based treatment is more common among the mothers of rural areas than urban areas. ORS the appropriate low cost technology is effective, easy availability in all parts of the region. But mothers are right in saying that in order to give ORS solution to a child it needs a lot of dedication and patience on the part of the mother to see the encouraging effects of the solution. While hospital-based treatment is more common amongst the urban mothers the reason for this attitude of mothers is that health centers are easily accessible and available as compared to their counter parts who prefer treating their children at home. Despite that 2% mothers from urban areas take their children to non certified medical practitioners as compared to 0.7% mothers from rural areas. The reason being the hard set traditional beliefs, illiteracy and ignorance on part of mother that plays a crucial role in their attitude.

Although majority of the study group breastfed their children but still they stopped weaning diet as their prime concern was to stop diarrhea.¹⁰ However interaction between malnutrition and diarrheal disease is bi-directional.¹¹ Increase in immunization coverage, better health care access, improvements in water and sanitation and other socioeconomic changes the effect on both diarrheal mortality and childhood nutrition. Recent trends in mortality from diarrhea and the prevalence of malnutrition should be interpreted in the light of these complex relationships.¹²

Since personal hygiene and environmental sanitation are of utmost importance in prevention of diarrhea, health education must receive higher priority. For this reason, education of caretakers particularly mothers should be considered as an important intervention in prevention of diarrheal diseases in young children.

Urban mothers have good knowledge and practice as compared to their rural counterparts about oral rehydration solution. It is mostly because of the fact that it is easily prepared and is convenient for the care giver to prepare and to give to their child. Also globally, the proportion of diarrheal episodes treated with oral rehydration therapy is estimated to have risen from less than 15% in 1984 to approximately 40% in 1993.¹³ This is due to increased breast feeding practices, weaning practices, improvement in sanitation and immunization against measles.

CONCLUSION

It is concluded that knowledge and attitude of mothers regarding control of diarrheal diseases is quite appreciative. Home based treatment is adopted mostly by rural mothers while most of mothers from urban areas take their child to hospital for treatment. While majority of the mothers in urban and rural areas knew about the preparation of S.S.S and ORS solution, however most of the mothers who correctly practice S.S.S and ORS solution preparation are from urban areas.

RECOMMENDATIONS

Shortage of funds, lack of trained personnel, greater emphasis on efforts in the provision of medical care to urban areas, and inappropriate medical education are some of the reasons which make one cautious when making recommendations.

Health education of mothers about the proper use and preparation of oral rehydration fluids should be pursued and incorporated into existing integrated management of childhood illnesses programme. In addition emphasis on the continuation of breast feeding and type of weaning diet during an episode of diarrhea.

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