IMPACT OF COMORBIDITY AND SOCIOECONOMIC STATUS ON QUALITY OF LIFE IN PATIENTS WITH CHRONIC DISEASES WHO ATTEND PRIMARY HEALTH CARE CENTRES

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SUMMARY

Aim: The aim of the study was to analyse the impact of chronic disease on the quality of life (QoL) and how QoL changes with comorbidity and socioeconomic status in persons who attend primary health care centres.

Methods: The group of participants comprised 2,560 people who contacted six primary health care centres in Ankara. The level of QoL was determined by the World Health Organization Quality of Life Questionnaire Abbreviated Version (WHOQOL-BREF).

Results: Mental disorders and diabetes-hypertension comorbidity had the most negative effect on the QoL. In the physical domain of the WHOQOL-BREF, the effect of diabetes-hypertension comorbidity is greater than the additive effect of hypertension and diabetes individually. The co-occurrence of any disease with cardiovascular disease does not change QoL within any domain, except for the co-occurrence of any disease with musculoskeletal diseases which deteriorated QoL in the physical domain. The higher income and socioeconomic status corresponded to higher QoL.

Conclusions: The effect of comorbidity on QoL can be different from the additive effects of the co-occurring diseases. Socioeconomic factors undoubtedly affect the relationship between chronic diseases and QoL, and this relationship points to health inequities among socioeconomic groups.

Key words: quality of life, primary health care, comorbidities, health inequalities

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INTRODUCTION

Noncommunicable diseases cause 63% of deaths worldwide. Furthermore, it is estimated that deaths from noncommunicable diseases will increase by 15% between 2010 and 2020 (1). As the world's population gets older and the frequency of chronic diseases increases, the frequency of comorbidity will also increase (2, 3). It has been pointed out that in developing countries primary health care is the most available health service to meet the long-term requirements related to chronic diseases (4).

While there are studies concerning the effects of chronic diseases on the quality of life (QoL), studies concerning the interactions amongst chronic diseases and the effects of specific chronic disease combinations, especially at the level of primary health care centres (PHCs) are required (5–9). Because PHCs have a specific role in follow-up and long-term rehabilitation, the factors which determine the level of QoL of the patients can be useful information for conducting services and planning policies.

The frequency of chronic disease is higher in low socioeconomic groups (10, 11). Moreover, comorbidity is more frequently observed in low socioeconomic groups (12, 13), and studies indicate that QoL is lower in these groups (14, 15). It has also been pointed out that the socioeconomic differences determining QoL increase with time (16). These results suggest that studies of the effects of chronic diseases on QoL should also consider the socioeconomic determinants of health.

The aim of this study was to analyse the impact of chronic disease on QoL and how QoL changes with comorbidity and socioeconomic status for persons who attend PHCs.

MATERIALS AND METHODS

Study Population

The group of participants consisted of 2,560 people who attend six PHCs in the centre of Ankara province. The data were collected in October 2004, by conducting a face-to-face questionnaire with people ≥18 years.

Variables

The dependent variable in this research is QoL concerning health, assessed by the World Health Organization Quality of Life Questionnaire Abbreviated Version (WHOQOL-BREF). The independent variables are age, gender, level of education, socioeconomic group, income group, and the chronic diseases reported by the participants.

Socioeconomic Groups

In the questionnaire, one question interrogates the furnishings and assets in the households. For each of the items, a score of 1, 2 or 3 points was assigned, and 'socioeconomic points' were calculated. The total points obtained were used to categorize 3 socioeconomic groups: 0–10 points, 11–20 points and 21 points and higher.

Income Groups

The total income of the family was divided by the total number of people living in the household to obtain the household income per capita. The household income per capita was divided into 4 groups considering the values of the first quarter, median and third quarter.

Chronic Diseases

Chronic diseases are defined as illnesses diagnosed by doctors that persist for >6 months, as declared by the subjects studied. The source for the classification of the declared chronic diseases was the International Classification of Diseases 10th Revision (ICD 10). Since the most frequently declared diseases were diabetes mellitus (DM) and essential hypertension, these diseases were grouped under their own names, not in the disease groups according to ICD 10 classification. In accordance with ICD 10 classification, those ones listed under the title "Endocrine, nutritional and metabolic diseases" out of DM were the only thyroid diseases so these diseases were listed under their own names. The diseases listed under the title "Diseases of the circulatory system" out of hypertension were named "cardiovascular diseases". Since the only disease reported by the participants from the group of "Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism" was "nutritional anaemia", this disease was included under its own name. Other diseases were classified according to the ICD 10 coding.

Cardiovascular diseases, musculoskeletal diseases, mental disorders, thyroid diseases, digestive diseases, respiratory diseases, DM and hypertension are the groups that included >20 people, each of whom reported only one chronic disease. Thus, only these diseases were included in the analyses of QoL. The only comorbidity group that included >20 people was the group that reported hypertension together with DM. Therefore, this is the only comorbidity group included in the analyses of QoL.

WHOQOL-BREF

WHOQOL-BREF comprises 26 items with 24 items across the four domains of physical (7 items), psychological (6 items), social relationships (3 items), and environmental (8 items) QoL (17). The scale has been translated into Turkish, and the study of reliability and validity was performed (18). In accordance with the directives prepared for the users of WHOQOL-BREF, raw scores were calculated for every domain, and the scores were transformed to the converted scores on the scale changing in the interval between 0 and 100 (18).

Statistical Analyses

The Student's t-test, One-Way ANOVA and linear regression analysis (Enter model) were used. While comparing the groups having chronic disease pointed out in the analysis of variance and the group with no chronic disease taken as the control group, the Dunnett method was used as Post-Hoc method (Table 2).

In order to evaluate the effect of a certain chronic disease group on QoL, participants with no chronic disease and the ones with chronic disease, which effect on QoL had been investigated, were included. Nine different linear regression models were constituted

Table 1. *Distribution of declared chronic diseases according to gender*

Chronic diseases	Male (N = 992)		Female (N = 1,568)	
	n	%*	n	%*
Cardiovascular diseases	41	4.1	51	3.3
Musculoskeletal diseases	12	1.2	68	4.3
Mental disorders	8	0.8	22	1.4
Diabetes mellitus	65	6.6	101	6.4
Thyroid diseases	3	0.3	29	1.9
Hypertension	99	9.9	163	10.4
Nutritional anaemia	–	–	15	0.9
Digestive diseases	19	1.9	29	1.9
Diseases of the eye and adnexa	2	0.2	5	0.3
Diseases of the skin and subcutaneous tissue	3	0.3	12	0.8
Respiratory diseases	19	1.9	17	1.1
Diseases of the genitourinary system	8	0.8	8	0.5
Diseases of the nervous system	8	0.8	13	0.8
Neoplasms	3	0.3	3	0.2

*The percentage of the total number of persons examined

Table 2. *Comparison of the domain scores of the group having chronic diseases with the group reporting no chronic disease*

Chronic diseases		Means of WHOQOL-BREF scores (95% CI)			
	n	Physical	Psychological	Social relationships	Environment
None	1,834	73.6 (73.0–74.2)	66.7 (66.1–67.3)	65.1 (64.4–65.9)	63.1 (62.5–63.6)
		Difference of the means of WHOQOL-BREF scores (95% CI)			
Chronic diseases		**Physical**	**Psychological**	**Social relationships**	**Environment**
Cardiovascular diseases	50	−14.9 (−20.6/−9.4)***	−3.1 (−8.4/2.2)	−2.7 (9.5/4.1)	0.4 (−4.7/5.5)
Musculoskeletal diseases	48	−11.1 (−16.8/−5.4)***	−4.5 (−9.9/0.9)	2.6 (−4.3/9.6)	−1.1 (−6.3/4.1)
Mental disorders	24	−13.3 (−21.3/−5.3)***	−16.9 (−24.5/−9.3)***	−19.3 (−29.1/−9.5)***	−8.5 (−7.8/8.1)*
Diabetes mellitus	74	−7.9 (−12.6/−3.3)***	−4.8 (−9.1/−0.4)*	−4.1 (−9.8/1.6)	−4.2 (−15.8/−1.2)
Thyroid diseases	20	−5.7 (−14.4/−3.1)	1.4 (−6.9/9.7)	8.3 (−2.4/19.0)	0.1 (−8.4/0.0)
Hypertension	140	−12.3 (−15.7/−8.9)***	−3.3 (−6.5/−0.1)*	−2.5 (−6.7/1.6)	−1.1 (−4.3/1.9)
Digestive diseases	34	−9.4 (−16.1/−2.6)***	−2.5 (−8.9/3.8)	−5.7 (−13.8/2.4)	−4.8 (−10.8/1.3)
Respiratory diseases	26	−12.5 (−20.3/−4.8)***	−9.7 (−17.0/−2.4)**	−2.4 (−11.8/6.9)	−10.7 (−17.7/−3.7)***
DM and hypertension	51	−20.5 (−26.0/−14.9)***	−10.9 (−16.1/−5.7)***	−9.9 (−16.8/−2.9)***	−8.6 (−13.7/−3.5)***

***p < 0.001, **p < 0.01, *p < 0.05

Table 3. *The effect of comorbidity on WHOQOL-BREF scores*

	WHOQOL-BREF Scores Mean (SD)			
	Physical	Psychological	Social relationships	Environment
Existence of chronic disease				
None (n = 1834)	73.6 (13.1)	66.7 (13.2)	65.1 (16.6)	63.1 (12.5)
1 chronic disease (n = 483)	63.3 (18.6)	62.7 (15.1)	62.9 (19.7)	61.0 (14.2)
2 chronic diseases (n = 122)	55.1 (18.8)	58.1 (12.7)	56.1 (21.3)	57.8 (14.0)
3 chronic disease s (n = 28)	52.1 (21.9)	58.3 (17.1)	68.6 (19.2)	59.1 (13.6)
	***	***	***	***
Diabetes mellitus and hypertension				
Only DM (n = 74)	65.6 (14.6)	61.9 (13.5)	61.0 (17.8)	58.9 (12.6)
Only hypertension (n = 140)	61.3 (18.4)	63.4 (13.9)	62.6 (18.3)	61.9 (13.2)
DM and hypertension (n = 51)	53.2 (15.7)	55.8 (11.9)	55.2 (19.7)	54.5 (13.9)
	***	**	ns	**
Musculoskeletal diseases				
Individually (n = 48)	62.5 (21.3)	62.2 (15.04)	67.8 (17.7)	61.9 (17.7)
With the accompanying diseases (n = 31)	47.9 (24.9)	55.7 (16.0)	58.7 (24.6)	58.5 (13.5)
	**	ns	ns	ns
Cardiovascular diseases				
Individually (n = 50)	58.7 (16.1)	63.7 (12.1)	62.4 (16.8)	63.5 (12.8)
With the accompanying diseases (n = 37)	57.7 (20.9)	62.5 (13.6)	64.0 (17.6)	60.1 (14.7)
	ns	ns	ns	ns

***p < 0.001, **p < 0.01, *p < 0.05, ns = not significant

separately for every disease group (Table 4). In all of these models, gender, age group, level of education, income group, and socio-economic group were the independent variables.

In the regression analyses, the age of subjects was classified as 18–29, 30–39, 40–49, 50–59, 60–69 and ≥ 70 and according to the level of education attained, subjects were grouped as the primary school graduates, secondary school graduates and higher educated ones. For data entry and analysis, the programs Epi-Info Version 6.0 and SPSS 10.0 was used, with $p < 0.05$ as the level of significance.

RESULTS

The mean age of the 2,560 participants was 39.4 (SD 15.2); 61.2% were females, whereas 38.8% were males. The two diseases observed most frequently in both females and males were hypertension and DM (Table 1). Cardiovascular diseases were ranked 3rd in males, whereas musculoskeletal diseases were ranked 3rd in females.

The frequency of individuals with at least one chronic disease was 24.8%, and the frequency of comorbidity was 6.0%. Among

Table 4. *Linear regression models of the relation between WHOQOL-BREF scores and the presense of disease, educational level, income group, socioeconomic group*[x]

Diseases	Physical		Psychological		Social relationships		Environment	
	β	p	β	p	β	p	β	p
Diabetes mellitus								
Educational level	−0.15	ns	0.56	ns	−0.05	ns	0.74	**
Income group	1.05	**	1.58	***	1.57	***	2.03	***
Socioeconomic group	2.66	***	2.97	***	2.79	***	2.19	***
Disease	−4.52	**	−2.33	ns	−1.23	ns	−3.67	*
Hypertension								
Educational level	0.31	ns	0.61	*	0.03	ns	0.75	**
Income group	0.85	*	1.49	***	1.44	***	1.91	***
Socioeconomic group	2.71	***	3.23	***	2.99	***	2.56	***
Disease	−6.92	***	0.26	ns	2.15	ns	−0.53	ns
Diabetes mellitus and hypertension								
Educational level	−0.01	ns	0.54	ns	0.14	ns	0.76	**
Income group	0.78	*	1.44	***	1.49	***	1.92	***
Socioeconomic group	2.89	**	3.25	***	2.87	***	2.38	***
Disease	−14.33	**	−5.72	**	−3.89	ns	−6.80	***
Cardiovascular								
Educational level	−0.07	ns	0.56	ns	−0.03	ns	0.65	**
Income group	1.09	***	1.59	***	1.64	***	2.09	***
Socioeconomic group	2.73	***	3.19	***	2.86	***	2.31	***
Disease	−12.44	***	−2.25	ns	−1.67	ns	−1.10	ns
Musculoskeletal								
Educational level	0.16	ns	0.69	*	0.14	ns	0.82	**
Income group	0.93	**	1.46	***	1.48	***	1.94	***
Socioeconomic group	2.52	***	3.16	***	2.82	***	2.38	***
Disease	−8.53	***	−2.64	ns	4.62	ns	−0.83	ns
Mental								
Educational level	−0.01	ns	0.63	*	0.10	ns	0.69	*
Income group	0.99	**	1.47	***	1.58	***	2.02	***
Socioeconomic group	2.67	***	3.09	***	2.82	***	2.30	***
Disease	−15.62	***	−19.48	***	−20.77	***	−11.19	***
Thyroid								
Educational level	−0.12	ns	0.58	*	0.11	ns	0.63	*
Income group	1.03	**	1.53	***	1.57	***	2.04	***
Socioeconomic group	2.66	***	3.07	***	2.76	***	2.23	***
Disease	−4.69	ns	1.70	ns	8.01	*	−0.74	ns
Digestive								
Educational level	−0.09	ns	0.53	ns	0.03	ns	0.57	*
Income group	1.01	**	1.55	***	1.56	***	1.97	***
Socioeconomic group	2.79	***	3.08	***	2.92	***	2.48	***
Disease	−7.91	***	−1.86	ns	−5.01	ns	−5.88	**
Respiratory								
Educational level	−0.01	ns	0.58	*	0.05	ns	0.74	**
Income group	0.93	**	1.57	***	1.62	***	2.05	***
Socioeconomic group	2.78	***	3.11	***	2.72	***	2.31	***
Disease	−12.63	***	−9.82	***	−2.72	ns	−11.02	****

[x]Into all the linear regression models, age group and gender has been taken into the model except for the variables taking place in the table. ***$p < 0.001$, **$p < 0.01$, *$p < 0.05$, ns = not significant

the participants with a chronic disease, the frequency of comorbidity was 27.4%.

Table 2 shows that a significant difference was determined in the physical domain only for cardiovascular diseases, musculoskeletal diseases and digestive diseases. A significant difference was determined in all domains for mental disorders and DM-hypertension comorbidity. A significant difference was determined for DM and hypertension in the physical and psychological domains, and for respiratory diseases in the physical, psychological and environmental domains.

When the number of chronic diseases increased in the physical domain, the QoL scores decreased (Table 3). For the other domains, when the number of chronic diseases increased up to two diseases, the QoL score decreased. Relative to only DM and only hypertension, DM-hypertension comorbidity resulted in the lowest QoL score across all domains. Except for the domain of social relationships, there was a statistically significant difference among the groups of DM, hypertension and DM-hypertension. There was a statistically significant difference between the QoL scores in the physical domain for those who had only musculoskeletal diseases and for those who had another chronic disease accompanying musculoskeletal disease.

In Table 4, the models were constituted by including the participants with no chronic disease and the ones with the chronic disease, which effect on QoL had been investigated. The only diseases bearing a significant effect across all domains were mental disorders. DM-hypertension and respiratory diseases had an effect on the physical, psychological and social relationships domains. DM and digestive diseases had an effect on the physical and environmental domains. Hypertension, cardiovascular diseases and musculoskeletal diseases had significant effects only on the physical domain, and thyroid diseases had an effect only on the domain of social relationships. For all of the models, the income and socioeconomic status had significant effects.

DISCUSSION

Effect of Chronic Diseases on Quality of Life

DM-hypertension comorbidity and cardiovascular diseases had the most negative effect on the QoL scores in the physical domain. Mental disorders had the worst effect on the psychological and social relationships domains, and respiratory diseases had the worst effect on the environmental domain (Table 2). Different ranking has been found in the studies comparing the effect of different diseases on QoL: respiratory diseases, cardiovascular diseases, hypertension, DM, musculoskeletal diseases, stroke, depression and anxiety are listed as the diseases with the greatest negative effect on QoL (5, 19–22).

The negative effect of respiratory diseases on the environmental domain score raised concerns about the possible environmental influence. More detailed epidemiological research is required to reveal the environmental factors that can cause the respiratory diseases.

Mental Disorders and Quality of Life

The groups in which a significant difference was determined in all domains were mental disorders and DM-hypertension comorbidity (Table 2). Mental disorders were the only diseases having a significant effect across all domains in the linear regression models (Table 4). Depression, anxiety and somatization were the mental disorders observed most frequently at PHCs (23, 24). Somatic symptoms frequently accompanied anxiety and depression, and physical symptoms were evident in these patients (23, 25). The results indicate that depression can cause a decrease in many QoL scale domains including the physical domains (21, 26). In our study, we attributed the failure of participants with mental disorder in all domains to the possible somatic symptoms accompanying mental disorders. On the other hand, chronic diseases can be related to increased depressive symptoms, and the depression accompanying chronic diseases can negatively affect QoL (27, 28). These results suggest that providing mental health services for PHC patients with a mental disease as well as patients with a physical chronic disease is essential for increasing of QoL.

Effect of Different Comorbidity Combinations on QoL

All outcomes showed that DM-hypertension comorbidity had a strong negative effect on QoL (Tables 2–4). Studies indicate that QoL is worse with DM-hypertension comorbidity compared to either DM or hypertension alone (29–31).

With the linear regression model, we noticed that the effect of DM-hypertension comorbidity ($\beta = -14.33$) was greater than the total of separate effects of hypertension ($\beta = -6.92$) and DM ($\beta = -4.52$). The results suggest that the effect of comorbidity on QoL was greater than the total of separate effects of the diseases. This suggestion is supported, for instance, by the study of synergistic effect on QoL found for the combination of coronary disorders and stroke (7).

The QoL scores decreased with an increasing number of up to three chronic diseases in the physical domain, and with an increasing number of up to two diseases in the other domains (Table 2). Consistent with our study, others have indicated a clear decrease in the QoL scores related to physical health with the increasing number of accompanying diseases (32, 33).

Cardiovascular diseases had the biggest effect on QoL in the physical domain (Table 2, 4). However, when another disease accompanied cardiovascular diseases, a significant change did not occur in any domain compared to cardiovascular disease alone in those domains (Table 3). Musculoskeletal diseases had less of an effect than the other disease groups on the physical domain (Table 2, 4). However, when another disease accompanied musculoskeletal diseases, QoL declined most in the physical domain (Table 3). This result demonstrates that the different comorbidity combinations can affect QoL in different ways. Studies indicate that patterns of disease combinations influence the degree of loss of QoL, but research on specific morbidity patterns and their impacts on QoL is limited (34). While performing comorbidity studies, it should be remembered that every combination can correspond to different form.

Effect of Socioeconomic Variables on QoL

Socioeconomic variables were also included in the linear regression models of every disease group (Table 4). Within all domains, QoL got better when either the income or the socioeconomic status increased. Studies show that the QoL of low income

groups including the undereducated, women, minorities, divorced, and the unemployed is lower (14, 16, 33, 35). There are also studies investigating the effect of socioeconomic variables on the QoL of people having only one disease. For example, for DM patients, QoL is worse for women, members of low socioeconomic groups, less educated people, people without health insurance, and the unemployed (36–38). All results show that efforts to increase the QoL of people who have chronic disease cannot succeed without considering the social determinants of health.

Limitations of the Study

The presence of chronic disease based on the self-report of participants may be a limitation of this study. However, it was necessary to use an alternative source since the records of chronic diseases registered at PHCs were insufficient.

The reported diseases were grouped according to the ICD codes for evaluations. Although they may be of the same group, different diseases can affect QoL in different ways. Therefore, a comparison based on the specific diagnoses of disease would be more informative.

CONCLUSION

For mental disorders and the common comorbidities such as DM-hypertension, the development of follow-up and control programmes for patients attending PHCs would significantly promote QoL.

As was the case of DM-hypertension comorbidity, the effect of comorbidity on QoL can be different than the individual effects of individual diseases. Similarly, the effect of comorbidity accompanying cardiovascular diseases and the comorbidity accompanying musculoskeletal diseases, different comorbidity variants can affect QoL in different ways. Therefore, examining the chronic diseases in QoL studies without considering accompanying diseases and without specifying the components of different comorbidities can lead to false results.

Finally, the socioeconomic status is the factor that most strongly determines QoL of patients of all disease groups and shows health inequities.

Conflicts of Interests

None declared

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